OVERSEAS TRADE AND TRANSPORT

ACCS

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MODERN TRANSPORT

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MAKING BRITAIN PART OF EUROPE

See Page 3

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CURRENT TOPICS

Chapter and Verse on the Tunnel

COMPLETION of the study group's report on the Channel Tunnel, subject of Mr. M. A. Cameron's interesting paper to the Institute of Transport this week (dealt with on page 3), marks an important stage towards accomplishment of this great project. That the inquiry has from all angles been thorough and practical is fully apparent. Finance, of course, is all-important, and pending the imminent publication of the report judgment must be reserved. Meanwhile Mr. Cameron, who has evidently been identified with the inquiry but, without being indiscreet, could not indicate in figures the economic prospects, remarked that they were "reasonable." Finance indeed is the crux, for both the British and French Governments are already so committed to subsidies in other directions that neither could spare anything for a project which will compete strongly with air transport and may well put most of the existing shipping services to France out of business. As an engineering proposition the tunnel is practicable; electric traction dispenses with the need for ventilation, as road vehicles will be conveyed by rail, and with twin-tunnel construction the trains themselves will maintain the requisite air currents. Two years of planning between French and British railways augurs well for the collaboration which will be essential under working conditions, and former military strategic considerations are outdated in this nuclear age. Though the tunnel will contain no road it may indeed be more of a road than a rail tunnel because cars, lorries and coaches, which will go through on special flat wagons, will be free to come and go anywhere, whereas rail journeys will be affected by the difference between the British and Berne loading gauges. The latter disadvantage, however, will be reduced with the growth of the pools of coaches and wagons designed for through transit. It is an axiom that facilities beget traffic: there is little doubt that the tunnel will encourage it. The railways will be enabled to perform a function in a manner and to an extent possible with no other transport medium; and, as the lecturer remarked, the tunnel could be "a means to a very great end—the unity of Western Europe." For that alone it would be a welcome venture.

Road Traffic Bill Before Easter

THE debate on traffic engineering in the House of Commons last week gave an opportunity for Mr. John Hay, Joint Parliamentary Secretary to the Ministry of Transport, to anticipate the introduction "before Easter" of the new Road Traffic Bill. This measure will cover the setting up by the Minister of the London traffic management unit, as part of the plan to deal with London traffic. It will also include provisions, promoted by the Home Secretary, dealing with traffic wardens and a ticket system of traffic penalties. Mr. Hay emphasised that traffic engineering was no panacea. It was a useful applied science and art which could help, and he paraphrased a somewhat abstruse American definition by the words "traffic engineering consists of the application to road and traffic problems of common sense, based on accurate analyses of traffic movement and on a knowledge of proper highway engineering." Traffic engineering was not in itself a profession, but a branch of the much wider profession of highway engineering. Many ordinary highway engineers throughout the country already had experience and knowledge of traffic engineering techniques, and far more were acquiring such knowledge and skill. In the Ministry there are 16 professional traffic engineers who will now serve the new London traffic management unit. A motion by Mr. Norman Cole, Conservative Member for South Bedfordshire, welcoming research into, and the practical application of, traffic engineering was agreed to. As a measure of the problem Mr. Hay said that between 1954 and 1959 the number of vehicles on the roads went up by about 50 per cent—from 5·3 to 7·9 million. If this rate continued, he said, the total would have increased to 10·5 million by 1965 and 15½ million by 1975. We venture the suggestion that the rate of growth may even be accelerated.

Transport for Industry

REPRESENTING a substantial cross-section of British industry, the Mansion House Association on Transport held its annual luncheon on March 11 with the new president, Mr. R. A. McNeile, in the chair. In proposing "The Ministry of Transport" he hoped that the association would be consulted by the proposed planning board before it took decisions on the future of the railways and that the B.T.C. would do the same by them on charges. He thought the shape of our railway system was against its commercial operation. Reshaping should take priority over financial conclusions; certainly a negative approach artificially restricting competitors was not the way to put the railways on their feet. Once traffics went by a prescribed means there was no certain means of telling how much extra that means cost in money or goodwill. It would also greatly concern them all if the obligation to carry under Section 2 of the Railway and Canal Traffic Act of 1854 were to be changed; the railways had an answer in the price machinery. The M.H.A. had consistently supported the trader's right to carry his own goods and the T.R.T.A. survey showed how right that was. But the trader must not be cut off from the busy streets of our cities; shops must be served at reasonable times or else the higher costs incurred would dissipate the savings made elsewhere by road improvements. In replying, Sir James Dunnett, Permanent Secretary, Ministry of Transport, said the size of modernised railway system we required—and no sensible man said the country could do without railways—needed great sagacity. Moreover it would be a pity if people in the railway world became dispirited at what it was going through. On Ministry policy he said it was sometimes alleged a policy meant directing people about, but to refrain was not necessarily not a policy. Road programmes called for restraint if we were to avoid inflation; some years were obviously needed to complete our motorway programme, while our city problems called for joint effort by road users, engineers, architects, social economists and administrators, as well as a measure of discipline for the individual.

Security of Lorries and Loads

SECURITY of lorries and their loads from theft was the major theme at the annual banquet of the Metropolitan and South Eastern Area of the Road Haulage Association, when Mr. A. E. Drain, area chairman, announced that rewards are to be offered for information leading to a conviction for theft or attempted theft of a lorry or from a lorry operated by a Road Haulage Association member. With the setting up of the Vehicles Security Committee, with representation from other organisations and the police, the fight had become a combined operation, with aid from every class of road user, all of whom were vulnerable. The secret of protection was to take the right precautions in advance—as ever, prevention was better than cure. Mr. Drain was proposing "The Guests," to which Sir Joseph Simpson, Commissioner of Metropolitan Police, replied, acting as a substitute for Sir Frederick Handley Page, who was indisposed. Sir Joseph offered some bouquets to lorry drivers for the high standard they set on the roads; if the figures for accidents were given per 1,000 miles run they would probably be seen to be very safe drivers. He commended the way haulage vehicles were looked after—but when breakdowns did occur they were a menace! The Metropolitan Police had been working out how no-waiting and unloading bans could be imposed with the minimum of inconvenience to lorry owners and their customers. The only real solution was to encourage avoidance of Central London, perhaps by a ring road, with some tunnels and underpasses. The Vehicle Security Committee started only last March but was making great strides under Mr. N. T. O'Reilly. They were trying to organise and list more secure parking places at night and they now called attention to cases where lorries were left unprotected; in addition the vehicle builders were joining in endeavours to make vehicles proof against theft.

Japanese Bulk Cargo Ships

TWO 20,000 d.w. ton universal bulk cargo vessels under construction by Mitsubishi Heavy Industries in Japan at its Kobe Shipyard, use patented designs of Macgregore, of Switzerland. An outstanding feature of these ships is ability to transport cargo ranging from 16 cu. ft. to 56 cu. ft. per ton. In this type of bulk carrier there are three 'tween-deck hatches and four main-deck hatches each arranged alternately along the centre line. Each of the three 'tween-deck hatches is partitioned off by double bulkheads. If the type of cargo requires it the cargo spaces forward and aft of these hatches can be used for ballast. The ships will be able to load 20,000 tons of iron ore or take a cargo of grain. The method of stowage allows double bottoms to be eliminated, giving more cargo space. Another feature is that only three bulkheads are required while a conventional type freighter of similar size requires six. The first of these ships was started last May for Maritime Carriers; the second is being built for Vanguard Shipping—both will sail under the Liberian flag. Principal dimensions will be 177 metres in length, 22·6 metres beam and 13·1 metres draft. Power will be provided by one Mitsubishi Kobe Sulzer diesel engine of 10,700 b.h.p., giving a speed of 16 knots.

British Radar on the Rhine

ORDERS for the fitting of more than 50 vessels navigating the Rhine have been placed with Decca Radar, Limited, for its new River Radar Type 215, in the three months since it was introduced. Interest in the equipment is so great that a new series of blind radar pilotage demonstrations is now taking place on the Rhine; it started at Duisburg on March 7 and will continue at Cologne, Wesserling and Mannheim until March 31. The Rhine vessel, m.s. *Lisbeth*, has been chartered for the purpose and is fitted out with the Decca River Radar Type 215 and associated rate-of-turn indicator. Visitors at the very full programme of demonstrations will include Rhine shipowners from a wide area, including representatives of North German Lloyd from Bremen, the German Rhine Police, many of whose vessels are already fitted with Decca River Radar, and other transport users from the Ruhr industrial areas. Immediately after the demonstrations, the radar will be removed from *Lisbeth* and installed permanently in a new police vessel now being completed at Mannheim.

Future of the Railways

RECENTLY in the B.B.C. Third Programme, Mr. H. P. Barker, a part-time member of the British Transport Commission who is also managing director of the Parkinson-Cowan group, spoke on the future of the railways and strongly supported the view that after a painful rebirth they would become self-supporting economically in a new and rationalised form; it was necessary to reduce the variety of the products and services produced and, secondly, simplified operation of the railways should be pursued as an end in itself. Simplification was the great liberator; it could be applied by regarding trains and not wagons as the unit of movement, by rationalising freight rolling stock or the provision of coaches for a few days' work in the holiday peak period and also by reducing the number of freight terminals. Far from being an outmoded instrument the pressure of public interest in railways was a measure of the public need for them. The railways would, in a broad sense, become self-supporting, given freedom, time and flexibility of operation. The cash consequences of the £350 million accumulated deficit posed urgent problems but were not a cause of despair. "It must be said that, unlike an ordinary business, the B.T.C. pays interest on its capital before and not after striking its annual accounting balance. During the years of nationalisation the total sum paid out in interest is about the same as the accumulated deficit. Viewed this way, the B.T.C.'s financial history is by no means a 'rake's progress.'" Through modernisation coming late, concluded Mr. Barker, when it was completed, we should not merely own a modern railway system but the most modern in the world. In the meantime it was hard to be living at home when the builders were in, but we could not reasonably complain too much of the noise of the hammers or the smell of the paint.

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The Editor is prepared to consider contributions offered for publication in MODERN TRANSPORT, but intending contributors should first study the length and style of articles appearing in the paper and satisfy themselves that the topic with which they propose to deal is relevant to editorial requirements. In controversial subjects relating to all aspects of transport and traffic this newspaper offers a platform for independent comment and debate, its object being to encourage the provision of all forms of transport in the best interests of the community.

An Equivocal Statement

DESPITE its acceptance of the objective underlying the report of the Guillebaud Committee—"that fair and reasonable wages should be paid to those engaged in the industry"—without, be it remarked, reference to "comparisons," the Prime Minister's statement in the House of Commons was equivocal and disappointing. Although there was no definite indication that Government support of the findings would be immediate and in full measure, there was the underlying assumption that the statement implied acceptance of the recommendations which the Transport Commission will shortly make as a result of the negotiations now in progress with the unions. Answering questions, Mr. Macmillan stressed the need for "an amicable settlement of the wages question and all that goes with it." The best thing, he said, was to let the procedure go on, "and then we shall have to see what is involved in the short-term finance which the Government obviously must make available, since it does not exist in the resources of the Commission." He hoped that "we may be able to make of this something much more satisfactory for all those employed in the industry," though there must be doubt whether the Government is going the right way about it. He saw the situation as necessitating a co-operative effort from the Government, Commission, trade unions and the public. So far, so good, but what of the means? The Government having decided to help the Commission the latter "must accept a radical alteration in its structure"; both railwaymen and public must realise that the industry must "be of a size and pattern suited to modern conditions and prospects"; the railway system must be remodelled to meet current needs and the modernisation plan "adapted to the new shape."

"Decentralisation" Again

IN its implied criticism of the Commission the statement was unfair and misleading. Can Mr. Macmillan justify his assertion that at present the Commission is taking away responsibility from where it ought to be and is tending to become an uncontrollable and top-heavy structure? The situation may well call for reappraisal, but there can hardly be a case for the sort of interference he contemplates; not surprisingly this seems to have caused resentment throughout the service. The inquiry, to be undertaken by a planning board, is for the purpose of securing "a more effective distribution of functions and a better use of all the Commission's assets." Most controversial is the proposal that reorganisation should include decentralisation of management so that the individual undertakings and the regions should be made "self-accounting and responsible for the management of their own affairs." In respect of the so-called individual undertakings separate accounts are in fact already prepared; to extend the principle to the railway regions, though laudable in theory, would be difficult and costly in practice. To be effective in a complete sense it would entail reinstitution of the Railway Clearing House, with its widespread staff of number-takers stationed at exchange points and marshalling yards many of which are no longer strategically situated for the purpose of wagon mileage assessment. It would mean, also, despite modern methods of computation, a return to the wasteful system of independent company accounting, and this merely to create a façade of regional independence which would encourage misleading and useless comparisons.

Yet Another Reorganisation

APPARENTLY we are in for yet another railway reorganisation, and this time by people prominent in industry but unskilled and inexperienced in the art of railway administration and operation. It seems to have been overlooked that only five years ago the Commission introduced, with Government approval, and in compliance with Section 16 of the Transport Act of 1953, its own scheme of railway reorganisation. This has been working well and is flexible enough to have enabled frequent improvement in the light of operating and administrative requirements. It has the advantage of area boards composed of business men responsible, amongst other things, for promoting initiative in improving services and effecting economies; ironically, their activities are to be examined by yet another board of business men! Another of the area boards' duties is to submit to the Commission budgets and forecasts of capital and revenue expenditure. If the railways are to continue to be operated efficiently as a balanced system, with a due measure of economy, this submission to a central body must go on, and so must the maintenance of standards in equipment and methods. Supervision and technical advice in the interests of the railways as a whole—and therefore of the community in general—are major functions of the Commission, and it would be difficult to find a more experienced body to fulfil them; the implication of grandiosity is not borne out by its annual reports; there is no evidence of mismanagement. Losses have been accentuated by uncontrollable circumstances which include considerable Government interference; now there are signs of a revival of traffic as we move away from the 1958 trade recession. The vicissitudes of the Commission we have previously reviewed; they must by now be appreciated by our readers, many of whom will no doubt endorse the following apt summary in *The Guardian* of March 11:

> The enormous losses piled up by the Commission are not the result of bad management but the outcome of having to try to carry out a long series of irreconcilable orders from successive Governments. The Commission has a statutory duty not to lose money—and a statutory obligation to maintain a number of services that can be run only at a loss. When it wants to put up fares or charges it must go through an involved process of asking for permission, and it is frequently told that it may not charge what it wants. It is supposed to be an independent trading body, but it is subject to "directions" from the Minister of Transport which may or may not be disclosed. . . . It is all very fine to talk of regional autonomy and business freedom for the railways, but how free is their freedom likely to be? Some of the Commission's troubles come from its obligations under obsolete legislation, but many derive from the reluctance of present-day Governments to permit unpopular reforms to be carried through.

To give time for modernisation to fructify, the Government must avoid seeming like the small child who digs up a bulb to see how its roots are progressing a day or two before it is due to flower.

No "Hiving-Off"?

THE public's contribution to the new deal is to take the form of "certain sacrifices of convenience," for example in the reduction of uneconomic services, and some increases will have to be made in fares and charges, in which the Commission is reported to be taking action. To be examined urgently is "the question of relieving the industry of restrictions and obligations which limit the Commission's earnings and prevent them from making the best possible use of their resources." If this means that the B.T.C. is to get rid of some of the lengthy and complex processes of the Transport Tribunal and the Transport Users' Consultative Committees, much as these worthy bodies try to help, the proposal is to be welcomed. Fortunately, there is no reference to the hiving-off of other activities, for which relief the Commission will no doubt give thanks. The Prime Minister, in a reference to available assets "which might be dealt with by those most expert in the task," indicated that "some of the land and development assets" might be handed over to a special body. Here again, if this implies removal of present restrictions on the sale and development by the Commission of its own lands and property the proposal is just and reasonable. But it is to be hoped that the results will be devoted to the permanent benefit of the Commission's undertakings and not just swept into the Chancellor's hands on a shortsighted short-term basis. He spoke of the need for both legislation and administrative action; the proposed planning board, whose duties he did not define but which will be onerous if they are to embrace all the changes and developments indicated, is to report to both Government and Commission. Meanwhile the Government is considering what form the interim financial arrangements should take to meet the short-term problem until reorganisation can be made effective. The long-term financial arrangements will depend upon "the size and structure of the undertaking" and will need the promotion of yet another Transport Bill; this is not likely to become law for many months, and much can happen in the meantime.

NEWS SUMMARY

THE report of the Channel Tunnel Study Group is expected this week. Abstract of Mr. M. A. Cameron's Institute of Transport paper on the scheme appears on page 3.

Parking meters are proposed for the area between Piccadilly and The Mall, Trafalgar Square and St. James's Street. The Mayfair area will be completely covered from April 4.

Swissair freight traffic showed a 24 per cent increase in 1959.

Pay rises have been recommended for municipal and London Transport bus workers.

The Minister of Transport opened the first 800 yd. of the Birmingham inner ring road on March 11.

The P. and O. liner *Canberra* was launched at the Harland and Wolff Belfast yard on March 16.

THE CHANNEL TUNNEL

Engineering, Operating and Economic Prospects

By M. A. CAMERON, M.Inst.T.

On the eve of publication of the report of an official study group Mr. M. A. Cameron, principal officer (administration), British Transport Commission, read a paper this week to the Institute of Transport on the engineering and economic prospects of a Channel Tunnel. The idea, which originated 150 years ago when a French mining engineer submitted a scheme to Napoleon, has since from time to time been subjected to political, military and business considerations, but without result. Three years ago, however, at the instigation of the Suez Canal Company and with American co-operation, action was taken following a statement in the House of Commons by the Minister of Defence that strategic objections were no longer an obstacle to its construction.

Under an agreement dated July 26, 1957, a study group was formed, including the British Channel Tunnel Company, in which the B.T.C. has a minority shareholding; a French group (chiefly the French Channel Tunnel Company in which the S.N.C.F. has an important interest, but also including the International Road Federation); the Suez Company; and Technical Studies, Inc., an American firm associated with American bankers.

These constituent groups agreed to put up the funds needed to carry out a new and thorough investigation into the engineering and economic aspects of the tunnel. The whole enterprise was to be effectively joint between Britain and France and co-chairmen were appointed—for France, a distinguished ex-Ambassador to the Court of St. James, M. René Massigli, and, for Britain, a former permanent head of the Foreign Office, Sir Ivone Kirkpatrick. M. René Malcor, a French civil engineer, was appointed as delegate, or whole-time executive officer, of the study group. An abstract of Mr. Cameron's paper follows.

THE first step on the technical side was to explore and ascertain the nature of the ground to be tunnelled through, and to do this as thoroughly as was possible without driving a pilot tunnel. The geophysical exploration, made with the aid of a transducer, has not so far revealed any major fault in the lower chalk which, being both impervious to water and free from rock, is almost the ideal material in which to bore a tunnel. The shaft and pilot tunnel on the French side at Sangatte, which had been submerged since 1883, were pumped out and the old pilot tunnel was found to be in remarkably good condition. The amount of water entering was significantly small. Physical prospects for the Channel Tunnel can therefore be accepted as definitely favourable.

Will it Pay?

The next and decisive question to be answered, if the capital needed to build the tunnel was to come from other than Governmental sources, was: Would the tunnel pay? Would the tunnel earn enough by tolls or other charges on the traffic passing through it to give a reasonable return, after providing for maintenance and renewals, on the considerable capital to be invested? The answer to this question, which would have to include estimates of the volume of traffic expected to pass at various levels of toll in periods up to 20 years ahead, had clearly to be given as impartially and authoritatively as possible, if it was to convince the investors of the world that the Channel Tunnel deserved their support.

The group therefore decided to entrust the task of forecasting the traffic through the tunnel to the Economist Intelligence Unit of London, in association with the Société des Etudes Techniques et Economiques (S.E.T.E.C.) of France, and the De Leuw Cather Company of Chicago.

These study units were given a detailed and comprehensive remit covering the pattern of trade between Britain and the Continent, existing transport costs, the pattern of passenger and motor-car traffic, the incidence of customs and immigration examinations, and future trends, including the degree to which the existence of a tunnel would stimulate traffic of all kinds. Traffic likely to be (*a*) diverted to, and (*b*) generated by the tunnel at various toll levels was estimated, and the optimum toll determined, estimates being made for two specified years, 1965 and 1980. One point that emerged at once was the tremendous prospective growth in accompanied car traffic, and the importance of catering adequately and liberally for it.

Rail and Road

The facts pointed clearly to one conclusion. The length of this tunnel was such that rail conveyance of road vehicles offered substantial advantages over a tunnel through which road vehicles would move under their own power. A Channel tunnel would have an under-water section at least 20 miles long. In addition, there are the approaches needed to descend to a depth some 300 ft. below low tide level, without exceeding an acceptable gradient.

The ventilation problems for a road tunnel are obvious. The fire risk and the consequences of fire have to be borne in mind. Elaborate measures for dealing with vehicle breakdowns would be needed. The monotony of driving through some 30 miles of tunnel can be imagined.

Practical experience on the Gotthard and Simplon Tunnels has shown how easy it is to take motor vehicles through long tunnels on trains which are in effect continuous platforms. Cars drive on and stand on rail trucks bumper to bumper while passengers remain in the cars. A train load of 90 cars can unload in five minutes, not over buffers but over loading wagons or platforms placed at each end, whose sides lower to bridge the gap between wagon and platform. The Swiss Railways use open trucks for this purpose, which are satisfactory at limited speeds. The average speed through these tunnels is 40 m.p.h. and the maximum 50 m.p.h.

Operating

For the Channel Tunnel, covered vans would be used, with an open loading/unloading wagon at each end of the train. Covered vans are necessary to permit speeds of 70-80 m.p.h. through single-track tunnels, as the wind pressures would be considerable and the hazards of opening car doors on open wagons evident.

To begin with, car-carrying trains are likely to consist of single-deck vehicles; but the dimensions proposed for the rail tunnels would allow of double-deck trains being run capable of carrying up to 300 cars per train. Side loading of these trains would permit loop working at the portal stations and avoid all shunting, so that terminal time would be minimised and use of rolling stock maximised.

Six double-decker trains per hour would give a peak capacity of 1,800 cars per hour, well in excess of the probable capacity of a road tunnel. More trains than this could be run if required. Lorries would, however, require to be loaded over buffers, but low loading rail trucks could accommodate loaded lorries with an overall height up to 12 ft. 6 in., to which most loads on road vehicles are already limited to clear bridges. Coaches could be carried on single-deck car-carrying wagons.

The estimated journey time for cars from portal station to portal station, when thus conveyed on fast electric trains, is three-quarters of an hour. The service would be designed to eliminate any need for pre-booking. One would drive to the portal station, pass through customs and immigration check points (assuming these to be still in existence, it is hoped that they would be joint French and British so as to avoid a check at each end), pay the toll and drive on to a train. At the other end one would drive off the train and be away.

One major advantage of the two single-track rail tunnels which are proposed is that they would be self-ventilating. Trains moving fast in one direction through a single-track tunnel have a piston effect, and electric traction generates no fumes.

Construction

The orthodox proposal would be to start with a service tunnel, 12 ft. in diameter, in the under-water section, driven from shafts sunk near the sea on either side and sunk deep enough to allow the under-water section to rise towards the centre, facilitating drainage. At the same time boring would go forward from these shafts and, if thought desirable, from the portals on the land sections of the tunnel; but a service tunnel would only be required on the under-water section.

On the information so far available, the probability is that the layer of lower chalk, which is so well suited to tunnelling, extends right across the Channel and is not interrupted by major faults. It is hoped to confirm this by further borings. A service tunnel would enable local defects in the chalk to be detected and dealt with in advance of the main tunnels.

The service tunnel would also be useful for access and removal of spoil; power supply cables would be located in it; and adits between the service and main tunnels every 500 metres or so would house some of the electrical and signal apparatus required in the main tunnels.

These main tunnels would be 21 ft. 4 in. in diameter, giving a loading gauge height of 15 ft., about a foot more than the Berne Conference standard gauge. The main tunnels would be 30 metres apart with the service tunnel central between them.

Alternative Method

An alternative method of constructing a Channel Tunnel has recently been put forward by a group of American contractors with French and British associates. They propose a submerged tube or tubes of reinforced concrete, precast in large sections, and then taken out and lowered to the sea bottom into a trench dredged to receive them, where the tubes would rest, covered with a few feet of spoil. The sections would be joined up under water by a special method, and would be handled by a device similar to that used for the pier-heads of the Mulberry Harbour which would float out to the required position, and then put down legs on which the main structure could raise itself above the sea. This structure would also carry the dredging mechanism needed to dig the trench.

Whatever the method of construction, the railway equipment provided in the Channel Tunnel would naturally be of the highest quality. Long-welded rails would be laid on sleepers with ample ballast. To allow trains to run at up to 90 m.p.h., the minimum general curve radius would be 1,200 metres, with 1,050 metres as the absolute minimum.

Traction

Traction would of course be electric, 25 Kv. at 50 cycles, with overhead transmission, fed from two main substations at the top of the coastal shafts. The use of 25 Kv. current would make it possible to avoid having a substation in the under-water section of the tunnel. The electric power supply would be in duplicate to ensure the highest possible level of security. Contours would make it necessary to put the British portal station some distance from the actual mouth of the tunnel, for a good deal of room would be required.

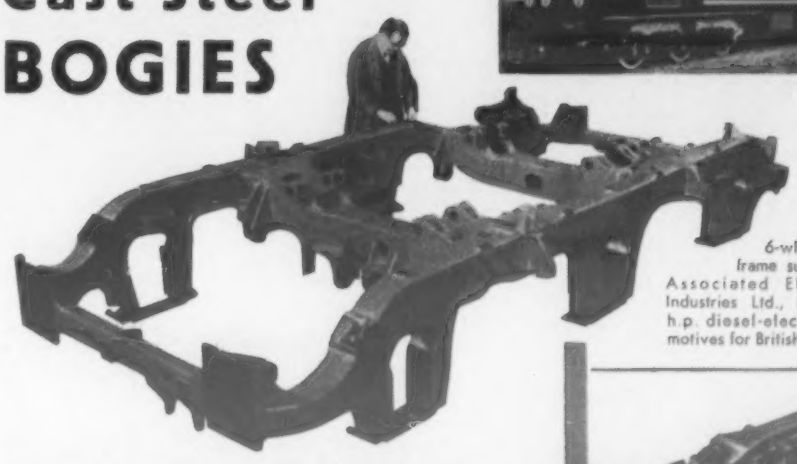
The unfortunate difference between British and Continental loading gauges precludes stock built to Berne Conference standard gauge limits from running over British Railways. Berne gauge trains would therefore have to terminate at the British portal station. To alter even the line from that point to London to Berne gauge would be too expensive to contemplate, for it would mean altering every platform, bridge and tunnel. Any through trains run from British destinations beyond the portal station to the Continent would have to be built to dimensions acceptable on both sides, i.e. to British gauge slightly modified, as are the Night Ferry sleeping cars and all the freight vehicles which come and go on the train ferries—the so-called "ferry" gauge stock. Through passenger expresses would certainly be run between London and Paris and London and Brussels, and possibly between other destinations at either end, but it would be necessary to provide at the British portal station for passengers to change from Berne to British gauge trains with the minimum of inconvenience.

Traffic

Quite apart from this traffic would be the accompanied car traffic. Some of this would be carried on through car-sleeper trains, built to "ferry" gauge, which could be run from any British station to popular Continental destinations. But most of this traffic would be conveyed in the special car-

(*Continued on page* 34)

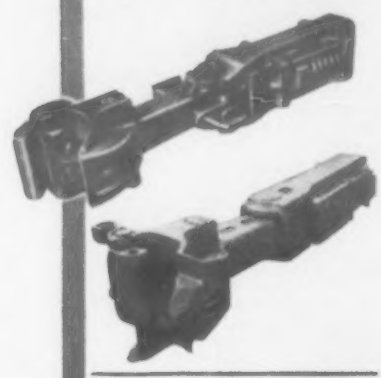
One Piece Cast Steel BOGIES



6-wheel bogie frame supplied to Associated Electrical Industries Ltd., for 1,200 h.p. diesel-electric locomotives for British Railways.

Automatic COUPLERS and Draft Gears

Assembled from parts of simple rugged design these couplers ensure safety to operatives, are easy to operate and require minimum maintenance.



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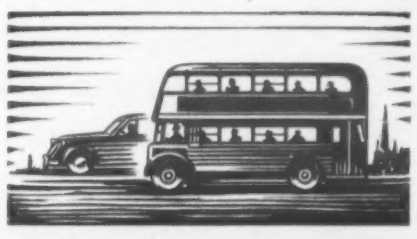
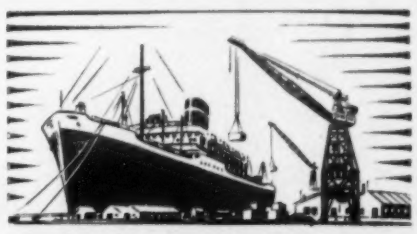
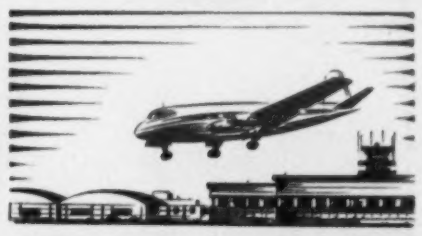


ROAD For many years various types of "Pyrene" fire-fighting equipment have been carried on London's Buses, G.P.O., A.A. and R.A.C. vehicles and used by all the leading operators, both here and abroad, of passenger and goods transport.

RAIL British Railways have always made full use of "Pyrene" fire protection—and now for their new diesel locomotives, part of a big expansion scheme, they have chosen "Pyrene" built-in CO_2 fire-extinguishing installations.



SEA Ships the world over are protected from fire by "Pyrene" foam and CO_2 fire extinguishing and alarm systems. More recently the "Pyrene"-E.D.-Hol" inert gas system, for the protection of ships' holds, has been installed in the newest cargo vessels.



AIR For complete power-plant and fuselage fire safety "Pyrene" smoke detecting and fire-extinguishing systems are in use on many of the world's most famous aircraft. Protection against airfield fire dangers is provided by an extensive range of "Pyrene" Crash Tenders, CO_2 equipment for "starting-up" fires and hand and portable fire extinguishers.

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AN INVESTMENT IN PEACE OF MIND

LORRY—BUS—COACH

Drastic Decision in Durban

SUBJECT to ratification by the full council, Durban Corporation has decided to sell or lease its transport undertaking, which last year lost £369,000. It was also decided by the trading undertakings committee of the City Council to spend £5,000 advertising the offer throughout the world. Any company tendering for a lease agreement would be allowed to state what subsidy it required from the council. Among the conditions the council is attaching to any sale or lease is that there should be no reduction in transport services. Government *apartheid* regulations which require separate buses for whites and non-whites on certain routes are blamed for a large proportion of the annual deficit. The total assets of the transport undertaking, which has 302 buses and 81 trolley-buses, are about £3,370,000.

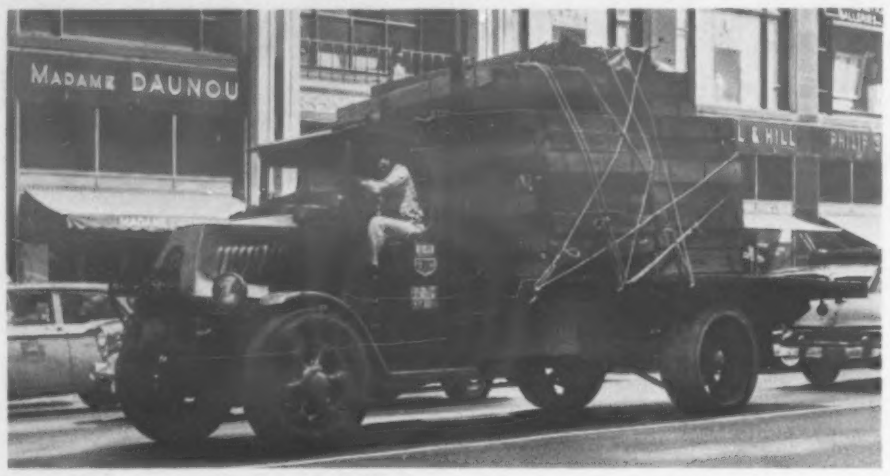
Thefts from Vehicles

AT the annual banquet of the Metropolitan and South Eastern Area of the Road Haulage Association the Commissioner of Metropolitan Police, Sir Joseph Simpson, gave some comparative figures of thefts from lorries for the London area. In 1958 there were 3,700 cases; in 1959, 4,000; the value of goods stolen had increased from £400,000 to £560,000, but the value recovered had risen from £35,000 to £91,000 and as a result of prosecutions there were 310 in gaol instead of 305. His comments on the situation appear on page 1.

A Curious Express Licence

BECAUSE the licence had already expired the Minister of Transport had "nothing to decide" on an appeal to him concerning it. This is his finding on an appeal by the Eastern National Omnibus Co., Limited, against the decision of the Metropolitan Traffic Commissioner to vary a London—Blackbushe express licence issued to Lewis Cronshaw, Limited, to add an additional terminal at Southend Airport. Eastern National also appealed against the refusal of a variation of its express service between London and Southend, so as to add the alternative terminals of 40 Edgware Road and Connaught Square, London, W.2. The applications concerned Eagle Aviation airport coach facilities. Cronshaw submitted that the licence had been "allowed to run on because it was known that the application to run to Southend was pending." The Minister says he is at a loss to understand under what provisions of the Acts the licence can have been "allowed to run on"; that it did not continue in force after its date of expiration on February 28; that as a consequence the decision of June 1, 1959, to vary the conditions attached to the licence was of no legal effect; and that as a further consequence he has nothing to decide on the appeal relating to the Cronshaw licence.

The decision in this case therefore relates only to the refusal to vary the conditions attached to the Eastern National licence. The main argument for Eastern National was that it already ran regular express services from London to Southend. Substantial weight appears to have been given by the commissioner to the admittedly illegal carriage of traffic by Eastern National in 1958, which was not disclosed in connection with applications for licences in 1958 and 1959. Either of the rival applicants was, on the evidence, capable of operating the service reasonably satisfactorily; it was therefore possible, without detriment to the public interest, to take account of this factor in deciding between them. The Minister has decided to make no order in respect of this appeal. The exact terms of the conditions attached by the deputy commissioner to the Cronshaw licence becomes hypothetical with the expiry of that licence, but the possibility of misinterpretation of the condition as imposed does arise, says the Minister. It appears to him that the nature of the licence, which is described in *Notices and Proceedings* as for "a service of express carriages between London termini and Blackbushe," would have been fundamentally altered by the addition to it of a route from London to Southend. The Minister considers it undesirable and contrary to the intention of the Acts that so radical a change should be made by variation of conditions. The preferable course would have been for a new and separate licence. It also appears undesirable that a route from London to London Airport should have been added to the licence at an earlier date.



An old-timer still going strong on the streets of New York. Of unidentified make, it is permitted a maximum load of 9 tons

Problem Child of Transport

TIME and again one heard people talking about the transport problem—rather as if it were analogous to the teen-age problem or the problem of drink, said Mr. R. N. Ingram, R.H.A. chairman, at Sheffield this week. "On the road haulage side of the industry we feel we are doing more than reasonably well in the service we provide for the public, and it is difficult, therefore, to know why we are continually being spoken of as a problem, rather as if we are juvenile delinquents," he added. "However, we are not the only pebble on the transport beach, and when one looks into the matter a little more closely it is found that there are, in fact, two main aspects of the problem. One is the growing congestion on the roads; and the other results from the bigger and bigger losses of the railways. There would seem to be two courses of action that would satisfactorily take care of these two problems. We should build more roads, and we should have fewer railways." This would merely be following the lesson of history. We must exchange the "permanent way" of life for the "motor way" of life, he said.

Works Service Without Licence

CONTINUED operation by a Stirling bus operator without a road service licence was alleged at a sitting of the traffic court in Glasgow on March 10. Mr. W. F. Quin, chairman of the traffic commissioners, said that the operator, Argyll Coaches, was fined £10 on January 28 at Stirling sheriff court for operating without a road service licence. It applied on March 10 to run an express workers' service between Stirling and Grangemouth, via St. Ninians, Bannockburn, Plean, Larbert, Camelon, and Falkirk. An objection was lodged by W. Alexander and Sons, Limited. Mr. Robert Farrell, for Alexander, asked that the application be refused. In spite of the conviction, he said, Argyll Coaches was continuing to operate, "and I am told that they are actually operating this morning."

"If he continues to operate, no doubt Stirling County police will take appropriate action," said Mr. Quin. The application was withdrawn.

Sheffield—London Excursions

GRANT of an excursion licence from Sheffield to London with a vehicle allowance of three every day of the year, must abstract traffic from British Railways, the Yorkshire area Traffic Commissioners were told. C. G. Littlewood, Limited, Sheffield, applied for a new excursion and tours licence to cover day trips to London, following the success of its London Airport excursions. Mr. J. Evans, for the company, said that it was granted the airport excursion in March, 1958, and carried 933 passengers the first year, this rose to 1,100 in 1959, and there had been many requests for excursions to London itself. There had been cuts in rail services from Sheffield to London since January, but it was not disputed there were adequate trains. Mr. C. G. Littlewood said he did not regard 360 miles in 12 hours' running time, including 71 miles on the motorway, as excessive. The application was refused.

United Carriers to be Wound Up

WHEN notice of termination of "A" and "B" agreements was sent by United Carriers, Limited, to contracting meat carriers and chartered operators in July last, it was indicated in a covering letter that the management, in consultation with B.R.S. and other operators, would proceed with plans for the continuance of the company's activities which would take into account the interests of all operators associated with the company. It was stated that the formation of a new company would probably be necessary. Subsequently the possibility of setting up a new company was explored and discussions took place with a number of operators whose co-operation in such a project would be essential to its success. It has recently become clear, says a statement issued this week, that the necessary support for a new company would not be forthcoming.

As from April 30, therefore, the operators who are now members of U.C.L. will be independent, but "it is hoped that the long years of their association will not be forgotten, that they will co-operate whenever possible, and in particular that they will refrain from cutting rates, a policy which, however attractive it may appear in the first instance, must inevitably, in the long run, be to the detriment of all." The customers of the company have been informed that it will cease operations after April 30, but, it says, its constituent members can be relied upon to provide as independent operators the services now afforded by the company. In approaching customers operators "will no doubt inform them that they have hitherto been members of United Carriers." British Road Services, the largest single member, announced in December last that it would withdraw from U.C.L. at a date not later than April 30, 1960.

Bus and Coach Developments

A. A. P. Elsey, Gosberton, applies for the licences of H. J. Nightingale, Spalding.

Premier Travel, Limited, plans a local circular route in Saffron Walden on Tuesdays, Fridays and Saturdays.

Morlais Services, Limited, applies for a workers' service to Pentrebach operated by F. Manning.

Merthyr Tydfil Corporation proposes revision of a number of its services.

Athelstan Garage, Limited, Malmesbury, seeks the Braydon—Malmesbury and Braydon—Swindon services of N. T. Fry.

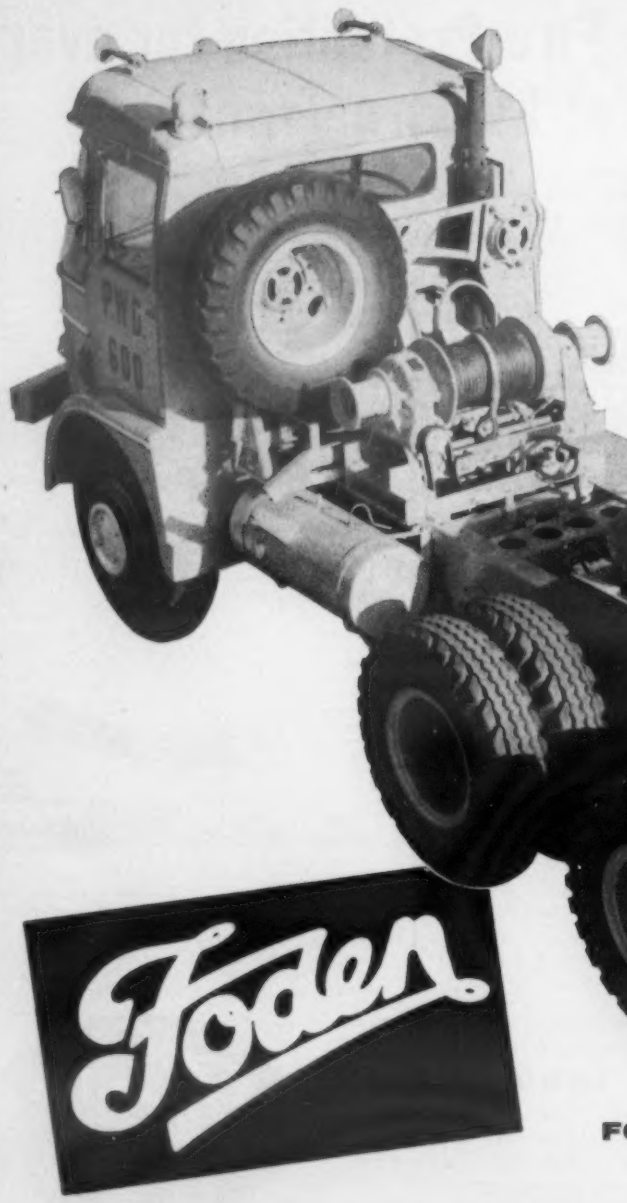
Aldershot and District Traction Co., Limited, proposes to extend its Guildford—Aldershot service 20 to Farnborough.

Western Welsh Omnibus Co., Limited, seeks a Cardiff—St. Andrews—Rhoose Airport—Fontygary service. The licence for the present Cardiff—St. Andrews service would be surrendered.

J. Laurie and Company, Hamilton, proposes an East Kilbride (Baillie Drive)—Eaglesham service to replace its East Kilbride Cross—Eaglesham service.

A. E. Hargreaves, Limited, Bolton, seeks the excursions and tours from that town of W. Knowles and Sons (Garages), Limited.

made to measure...



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AT THE SWISS SHOW

Preparation for New Regulations

LIBERALISATION COULD FAVOUR BRITISH PRODUCERS

THE commercial vehicle section of the Swiss Motor Show, the 30th in the series, which closes at Geneva on March 20, is notable for the exhibition by a number of Swiss and foreign manufacturers of goods vehicles and trailers anticipating certain liberalising regulations already written into Swiss Federal law and expected to become effective in May or June this year. In broad terms, the new regulations raise the weight limit of goods vehicles on two axles from 13 to 16 tonnes*; permit 5½ tonnes on a single-axle trailer and 10 tonnes on a two-axle trailer; raise the weight limit on any single axle to 10 tonnes; raise the maximum laden weight of articulated vehicles from 13 to 21 tonnes; and raise the maximum weight of a lorry and two-axle independent trailer from 23 to 26 tonnes. There have also been increases in permitted vehicle dimensions.

The new regulation for articulated vehicles might possibly in time bring a radical change in the pattern of Swiss heavy road haulage. While articulators in the past have not been unknown in Switzerland, the previous limiting weight of 13 tonnes—the same as for a rigid two-axle vehicle—has made their operation in general haulage quite uneconomic. The new weight of 21 tonnes is much more realistic and is causing many Swiss hauliers to consider the greater operational flexibility possible with articulated vehicles.

"Outer Seven" Agreement

Another factor which makes this Geneva Show different from previous events from the foreign commercial vehicle manufacturer's point of view is the "outer seven" trade agreement, which has given rise to speculation on the possibilities, hitherto practically non-existent, for the heavier classes of British commercial vehicle in Switzerland. In the past the Swiss market has been virtually closed to British vehicles of above about 5 tons capacity and imports of vehicles below this capacity have been limited by quota. Under the terms of the trade agreement, import of all vehicles should gradually be freed, but a number of the Swiss representatives of foreign manufacturers told us that they see little likelihood of this becoming fully effective. Protection of the Swiss heavy-vehicle industry is the reason given. Because of their low-volume production the Swiss manufacturers cannot hope to compete in price with, for example, British manufactures, though the quality of Swiss heavy vehicles is unsurpassed.

The other side of the picture was occasionally presented in conversation and this says that while the pressure to protect the Swiss manufacturing industry is very heavy, there is equally heavy pressure by operators, who seek the opportunity of buying commercial vehicles of their choice, often at little more than half the cost of the Swiss-made counterparts. A decision completely to free the imports of commercial vehicles, if only from other outer seven countries, could be a painful one for the Swiss and probably crippling to its own industry, in which concerns like Saurer and Berna have not only been the traditional suppliers of vehicles to the Swiss Armed Forces but have also marched with the leaders in world commercial vehicle technology.

The Swiss Market

However doubtful the future of heavy British commercial vehicle exports to Switzerland might be, the motorcar industry is about to make a determined attempt to improve its present position of fourth largest exporter to Switzerland. This was implied by Sir William Lyons, president of the Society of Motor Manufacturers and Traders at a reception given in Geneva by that body to mark the opening of the exhibition, when he announced the launching of a massive European sales drive. Much the same was said by Mr. Brian Rootes, managing director of Rootes, Limited, at an eve-of-show reception in Geneva, when he referred to the vast expansion, at an estimated expenditure of £160 million, now being planned by the British motor industry and the still great European market potential.

The British motorcar industry has certainly put on a magnificent show in Geneva; in combination with current trade alignments it could well bring about a significant change in Swiss car and van imports, which in 1959 totalled roundly 37,000 from West Germany, 17,000 from France, 7,000 from Italy and 6,000 from Britain. This would also affect the import of light commercial vehicles of up to about 15-cwt. capacity, last year's figures for which were 1,646 from West Germany, 598 from France and 121 from Britain.

Despite some restriction, the Germans also did well last year in the sale of buses and coaches to Swiss operators, no fewer than 81 new registrations of German-made vehicles being recorded compared with 119 Swiss-built passenger vehicles and a mere handful of other foreign makes, including three British A.E.C.s. The market for commercial vehicles of over 1-ton capacity was also dominated by the Germans, with a total of over 1,600 lorries, special-purpose vehicles and haulage tractors compared with about 550 new registrations of Swiss-built heavy goods vehicles and about 650 of all other foreign makes. New Swiss registrations of British commercial vehicles of all types in 1959 totalled nearly 300—20 vehicles fewer than in 1958—of which the chief contributors were B.M.C. (87), Bedford (68), Ford (64), Land-Rover (40) and Rootes (26). As well as the three A.E.C. chassis already mentioned, five Leyland buses were recently imported from the Netherlands, where they were assembled by Leyland Holland, in a barter deal and will shortly be going into service with Swiss operators. With an eye on the possibilities, Leyland Motors, Limited, has now appointed Garage de Montchoisy S.A., Geneva, as the new Leyland-Albion agent in Switzerland.

International C.V. Show

Despite a contraction this year in covered space allocated to commercial vehicles from 9,599 sq. ft. in 1959 to 8,328 sq. ft., the commercial and industrial vehicle section of the exhibition gave a very wide international presentation, with over 60 different classes of chassis produced in 10 different countries, including Soviet Russia. As always at Geneva, there was a massive display by German manufacturers, closely followed by France and Britain, though with one exception none of the British heavy-vehicle builders was exhibiting.

British heavy commercial vehicles were in fact represented solely by A.E.C. products, shown by the company's Swiss distributor, H. Kleiner and Company. On the stand were a Mandator tractor, coupled to a Taskers 12-ton capacity rear-steering semi-trailer mounting a 15,000-litre tank, and the A.E.C. three-axle Dumptruck. A second Taskers semi-trailer carrying a Kleiner 7 cu. m. tipping body was also shown on the stand. Emil Frey A.G. put on a fine show of Austin commercial vehicles, from the small A35 5-cwt. van up to a diesel-engined 702 tractor coupled to a Scammell semi-trailer for operation at the new 21-tonne weight, and also a variety of Frey forward-control cabs and freight bodywork.

The Frey coachwork included a large steel van and three-seat plastics cab on a 702 chassis and a brewer's body for carrying crated bottles, features

(*Continued on page* 19)

Contrast in frontal styles: An A.E.C. Mandator tractor with Duramin cab and Taskers rear-steering semi-trailer carrying a 15,000-litre (3,300 gal.) F.F.A. tank and, right, a U.S. Chevrolet Viking 5-tonner with latest normal control cab and independent torsion-bar front suspension

Russian R.A.F. 12-seat bus; Lauber 26-seat touring coach with Rootes two-stroke diesel engine at rear; Ford 6D diesel-engined Trader chassis with Fluckiger plastics cab; and, bottom right, Austin diesel-engined 702 with Frey brewer's body, incorporating side spring roller blinds and hinged side rails, and Frey three-seat plastics cab

* 1 tonne=1,000 kg.=0.984 tons.

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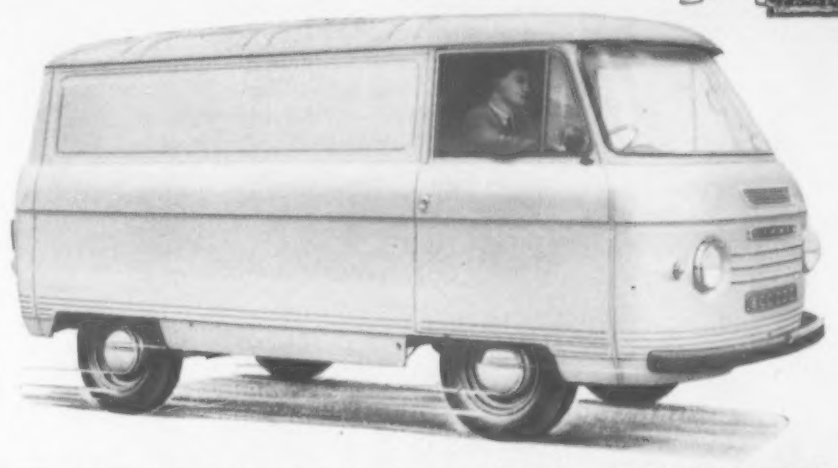
COURTENAY EDWARDS *in the* 'DAILY MAIL'



"The petrol-engined van possessed a lively performance with a fuel consumption rate of 28.4 m.p.g. at an average speed of 29.2 m.p.h. Fifty-six miles of the M1 motorway were covered at an average speed of 52.4 m.p.h." **Commercial Motor**

"The driving position is excellent, with a field of vision it would be difficult to improve upon". **Daily Mail**

"The handling characteristics and stability of the laden vehicle were certainly faultless on all types of road". **Modern Transport**

"What will appeal most to the tradesman is that smart looks and up-to-210 cubic feet capacity are allied to 30 miles-to-the-gallon economy from the petrol-engined versions and around 40 m.p.g. from the diesel units". **Evening Standard**

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Another great FOUR 99 tribute

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Spencer House, St. James's Place, London. S.W.1

29th January, 1960.

Your Ref: SAL/RCA/M-26.
Our Ref: CFW/EMC.

R.C. Allen, Esq.,
Perkins Engines Ltd.,
Peterborough.

Dear Mr. Allen,

You are already aware of the fact that in July 1959 we fitted one of your Company's Four 99 engines to one of our Bedford vans. The van selected was a 12 cwt. model but we fitted heavier tyre equipment to allow 15 cwt. to be carried.

I am sure you will be very pleased indeed to hear that this has up to date given excellent results. It has proved satisfactory in every respect and you may be sure that if we put any further machines of this size and type into service we shall have them fitted with this type of engine.

The van is operating wholly inside the London area. It is not possible to give the exact number of calls per day but it is averaging something in the region of 27/28. From this you will perceive that no long runs at all have been undertaken as yet. Mileage completed at the end of the initial six months is 8,209. 216 gallons of fuel oil were used. This gives us an m.p.g. figure of exactly 38. 19 pints of oil were used, this equals 430 miles per pint.

My kindest regards.

Yours sincerely,

C. F. Watts
General Transport Manager.

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Narrow-Gauge Locomotives for South Africa

BEYER-GARRATTS FOR 2-FT. GAUGE

SOUTH AFRICA, in addition to containing the world's largest 3 ft. 6 in. gauge system also possesses the greatest 2-ft. gauge mileage. In both instances the standards of design, construction and operation are high; the tonnage handled in each case far exceeds that of many standard- or broad-gauge systems. South Africa has shown what is possible on relatively narrow gauges when the administration is both progressive and imaginative.

The three main 2-ft. gauge systems of the South African Railways are situated in Natal, the Cape Midlands Division and in South West Africa. The work performed is of an exacting character, the onerous nature of which will be understood when it is recalled that train loads may be as much as 600 tons, while curvature and grades are severe by any standards. On the Stuartstown section there is a rise of 4,446 ft. in 98 miles; the ruling grade is 1 in 33, combined with curves of 150-ft. radius.

Scope for Beyer-Garratts

The operation of these lines has called for locomotives which, while severely restricted in axle-loading, have to be capable of producing a high sustained tractive effort despite the confines of the gauge. The Beyer-Garratt locomotive particularly meets such requirements and for many years this type has performed noteworthy work on the 2-ft. gauge. It is of interest to mention in passing that the first of the many Beyer-Garratt locomotives, now so widely and successfully employed in South Africa, was ordered in 1914 for the 2-ft. gauge in Natal. Numerous repeat orders have been received by Beyer Peacock and Co., Limited, for 2-ft. gauge Beyer-Garratts, mostly of the 2-6-2+2-6-2 wheel arrangement, and the Class NG/G16 locomotives delivered to the South African Railways in 1950 constituted excellent examples of modern steam power on a narrow gauge.

The South African Railways 2-ft. gauge line, running for some 250 miles north-west from Kranzberg on the route from De Aar to Walvis, known as the Otavi Railway, which terminates at Tsumeb, centre of the activities of the Tsumeb Corporation, is in process of conversion to 3 ft. 6 in. gauge. The Tsumeb Corporation recently ordered seven Beyer-Garratts to the S.A.R. Class NG/G16 design.

After these locomotives were built for the Tsumeb Corporation, in view of the Usakos—Tsumeb gauge conversion, they were taken over by the South African Railways, a possibility foreseen at the time the order was placed. As a result they have been delivered to the South African Railways at Durban and Port Elizabeth, for use on the Natal and Cape Midlands divisions.

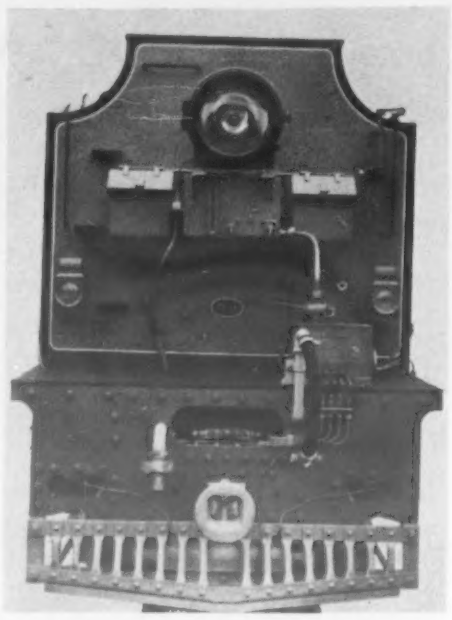
Severe Conditions

Conditions on the Otavi Railways are easier than those on the Stuartstown line, but are nevertheless severe, including gradients of 1 in 50. The standard radius on the Otavi line is generally 500 ft., but in some cases it is considerably less to avoid heavy cutting through rock. Difficulties of terrain were not the only ones facing the contractor when construction of the line commenced in 1903; a native rising was one of the many problems which arose; in such circumstances, to complete the line in three years, an average of 120 miles a year, was a creditable performance. It is of interest to note that the Beyer-Garratt locomotives under notice can work trains of six times the weight handled by the original 0-6-2 tank locomotives.

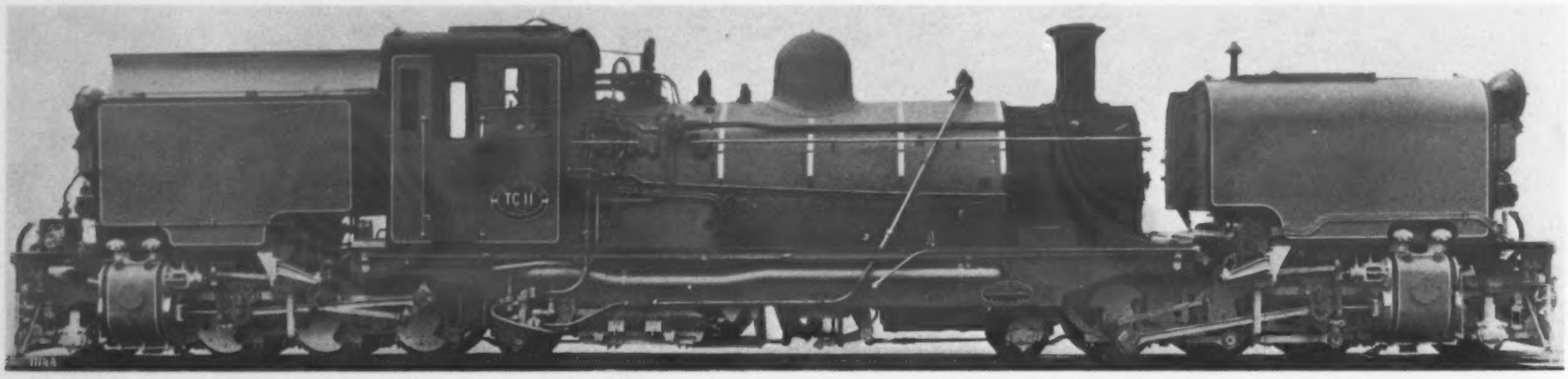
Despite their small size the seven Beyer-Garratt locomotives now delivered, together with the engines delivered in 1950 to the S.A.R., are of modern design and one excellently suited to the operating requirements. Many refinements are incorporated, including the Beyer-Peacock patented self-adjusting pivot. This pivot, working in an oil bath, makes a considerable contribution to improved availability, for prevention of slackness in the pivots additionally removes the need of attention which would otherwise be required to pipe joints.

Boiler Dimensions

The boiler barrel, which it is interesting to note has a diameter nearly 2.5 times the gauge of the locomotive, houses 152 tubes of 1¾ in. diameter (o.d.) and 15 flues of 5½ in. diameter (o.d.). The Melesco superheater elements are of 1½ in. diameter (o.d.). Compared with the NG/G16 locomotives, the main modifications which have been made in design are in the bunker and water capacities. There is now space for an additional 2.2 tons of coal in the rear bunker, the 625 gallons of water previously carried there having been displaced. The water capacity of the front tank has been increased from 1,200 gallons to 1,325 gallons.



Hind end view of 2-ft. gauge locomotive



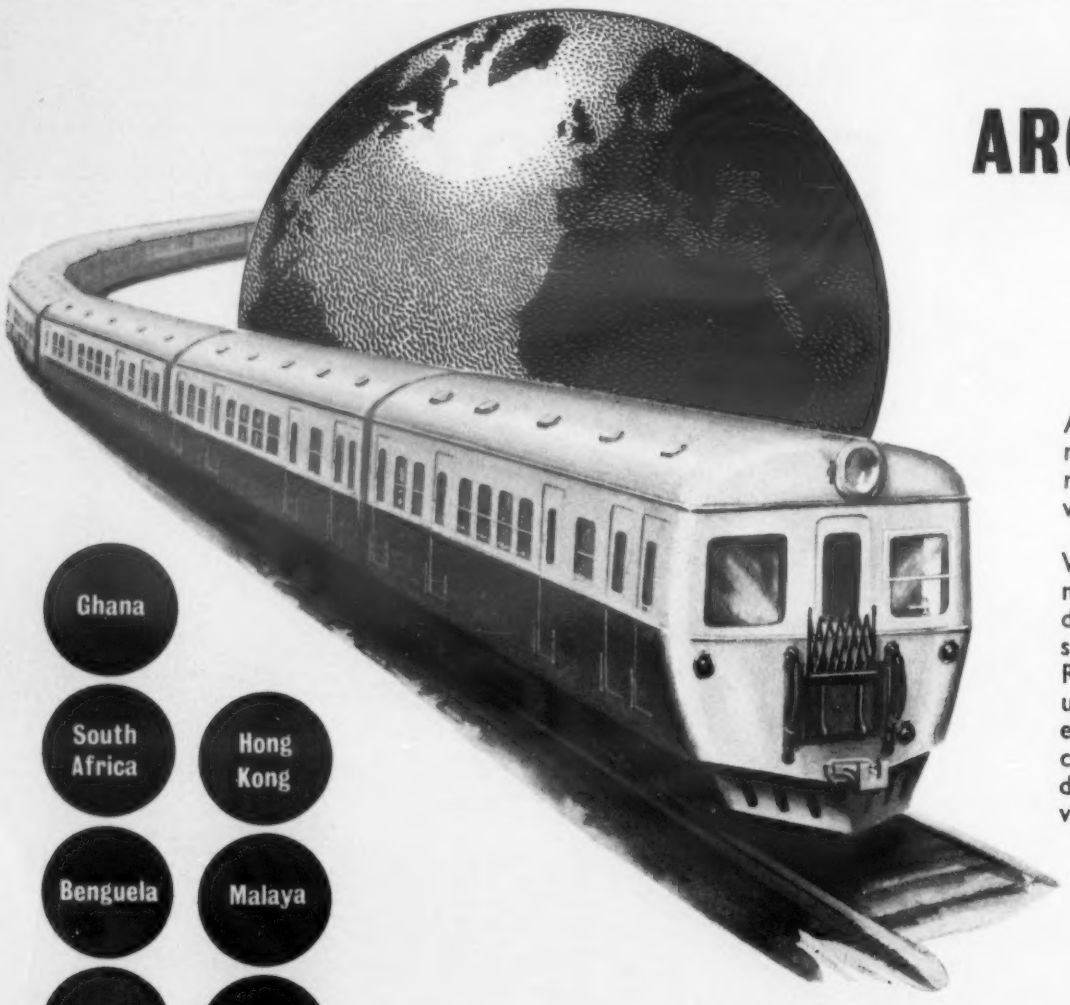
One of the seven 2-ft. gauge 2-6-2+2-6-2 Beyer Garratt of SAR NG/G16 class built for Tsumeb Corporation and now transferred to South African Railways Natal and Cape Midlands divisions

LEADING PARTICULARS

Cylinders (4)		12 in. by 16 in.
Wheels, coupled		dia. 2 ft. 9 in.
Wheels, carrying		dia. 1 ft. 9 in.
Heating surface:	Tubes	845 sq. ft.
	Firebox	75 sq. ft.
Total evaporative		920 sq. ft.
Superheater surface (measured inside)		144 sq. ft.
Total heating surface		1,064 sq. ft.
Grate area		19·2 sq. ft.
Boiler pressure		180 lb. sq. in.
Coal capacity		6·2 tons
Water capacity		1,325 gallons
Tractive effort at 75%, b.p.		18,850 lb.
Tractive effort at 85%, b.p.		21,380 lb.
Weight of locomotive in working order		61·4 tons

The steampipe expansion joints, hitherto located at the cylinders, are now situated adjacent to the steampipe ball joints at the pivot centres; this has improved accessibility. The original copper flexible pipes, providing for articulation at the pivot centres, have been superseded by Aeroquip steam quality hoses for four locomotives and Compoflex seamless bronze copper-braided hoses for three locomotives. The perforated plate spark arrester has, in the latest engines, been replaced by Draftac mesh screens. The two shut-off valves on the main steam pipes are no longer provided. Another boiler accessory modification is the fitting of two ashpan drench cocks instead of one. Equipment includes two Gresham and Craven No. 8 self-starting injectors, a Sellers drifting valve, Stone's lighting, Ross pop safety valves, two Dewrance water gauges, Spencer Moulton buffing springs and

(*Continued on page* 32)



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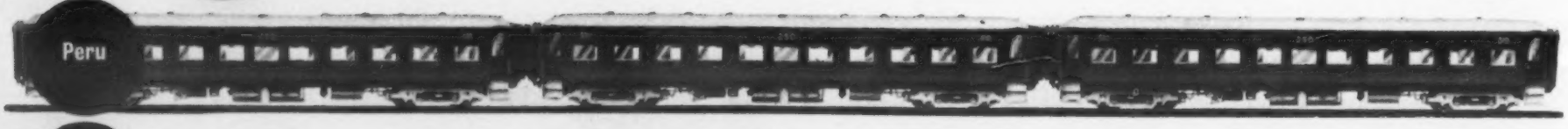

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MARINE RADAR TOURS EUROPE

A.E.I. Equipment Demonstrations

MARINE radar equipment and various types of associated apparatus manufactured by divisions of Associated Electrical Industries, Limited, is now being carried on a 5,000-mile tour of Europe, where it is due to be demonstrated at 30 different centres and ports in Belgium, the Netherlands, Germany, Denmark, Sweden, Norway, France and Italy. The itinerary covers a period of five months. Carried in a self-contained mobile demonstration unit based on a Karrier-Carrimore articulated van, the equipment includes two marine radar sets, telephones, signalling and bridge instruments, fluorescent lighting equipment and a 6-kW engine-driven generator and voltage regulator to provide power supplies for demonstrations.

The vehicle comprises a Karrier Gamecock tractor and Carrimore drop-frame semi-trailer. The tractor is on a 9 ft. 7 in. wheelbase and is powered by the Commer six-cylinder underfloor petrol engine and four-speed synchromesh gearbox. It is fitted with the latest double (crew) cab of the type used widely on municipal vehicles. The 6-kW generator is mounted behind the cab and is driven by the vehicle engine through a power take-off.

The Karrier Gamecock-Carrimore mobile radar unit of Associated Electrical Industries now on a 5,000-mile European demonstration tour

Details of Equipment

The main item of demonstration equipment is the A.E.I. (B.T.H.) Escort marine radar (as fitted to the liner *Queen Elizabeth*), features of which include "Chart-Plan" presentation and exceptionally simple control. The other radar equipment on show is the type RMS2, the performance and reliability of which have also been proved at sea. A.E.I. fluorescent lighting for ships is demonstrated by six fittings set into the angle between the walls and the ceiling of the demonstration room. These are of a popular enclosed type, using Mazda 2-ft. 20-watt lamps supplied at 220 volts d.c. Two similar fittings are used for lighting the front of the trailer unit.

The A.E.I. telephones shown are of the latest type for marine purposes. Those in the demonstration room are Centenary Neophone instruments—the first printed circuit telephones developed. They are as used in passenger cabins on large liners and are available in a wide range of colours. Communication between the tractor and trailer units is by means of Navigational telephones, the one in the tractor unit being of the transistorised noise-cancelling type, which includes an amplifier for use with an external loudspeaker.

Voltage of the A.E.I. 6-kW power generator is stabilised by an A.E.I. Magnestat voltage regulator, which provides very close stabilisation for large fluctuations in load and is of a type used extensively for marine installations.

The Escort marine radar (Type 601), which operates on a wavelength of 3.15-3.19 cm. (9,500-9,420 megacycles), has been developed by British Thomson-Houston, which company was one of the pioneers of centimeter radar and built its first radar equipment over 18 years ago. Principal features of the Escort equipment are seven scales from ¾ to 48 miles, with Chart-Plan true-course displays available on scales from ¾ to 12 miles; relative, ships' head-up, azimuth-stabilised, Chart-Plan and off-centred relative displays, all instantly switchable and automatically aligned; automatic or selected instantaneous centre-spot reset, with pre-computed correct reset position; four separate direction and speed inputs on Chart-Plan displays, providing automatic water- or ground-stabilised displays; azimuth stabilisation orientated either north or south at the 12 o'clock position on the display tube; and automatic warning of reduced range performance, faulty operation or azimuth error.

Attractive Features

Probably the most attractive features of the Escort are the electronic automatic switching and control circuits, which eliminate a number of manual controls necessary with electro-mechanical true-course or true-motion equipment, and the Chart-Plan presentation on ¾, 1½, 3, 6 and 12 miles range scales, made possible by the ability to apply tide-direction and tide-speed inputs directly to the centre spot separately from the automatic ship's course and speed input. As the tide correction is a separate input remaining true once set for a particular area, no adjustment is required each time course is changed. The ability to orientate the displays north or south is also an important facility, greatly assisting picture interpretation when own ship is steering a southerly course by maintaining the relative relationship between the heading marker on the display and the ship's head. It will be a welcome facility to pilots and ship's officers, obviating the need for them mentally to stand on their heads to interpret a display, a possible cause of port-starboard errors when issuing urgent orders.

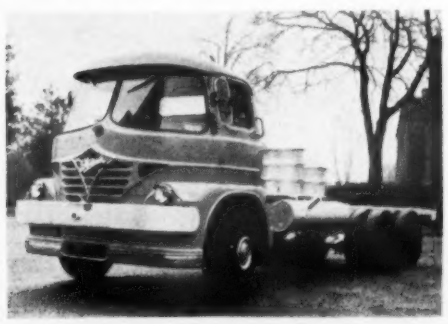
General features of the equipment include a 12-in. fixed-focus cathode-ray tube with orange filter to improve afterglow characteristics and

(*Continued on page* 34)

Hard Work in Rhodesia

BY BRITISH-BUILT VEHICLES

WITH a firmly founded faith in the capabilities of the Foden tractor unit, a newly formed company, Umkondo Transportation (Pvt.), Limited, Pietersburg, nonchalantly undertook four years ago to haul every month 800 tons of copper concentrate 305 miles through the Southern Rhodesian bush. The undertaking involved a 305-mile each-way journey through the mosquito-ridden bush in sweltering heat, in dust storms and through the rain, mud and floods of the wet seasons. It required a continuously maintained day-and-night schedule, six days a week, year in year out. Three Foden FGTU 8/40 tractor units were used on the job for the first three years and another was purchased about a year ago. Their service record for the four years indicates that each vehicle in operation was on the road 44 hours in every 48; each vehicle had travelled more than 250,000 miles without a major mechanical failure; and each vehicle pulled a trailer and semi-trailer with a gross weight of 46 tons and a weighed payload of 27½ tons.



A Fibreglass cab on a Foden six-wheeler which is to be tested thoroughly under Australian conditions by the Foden distributor against the possibility of standardising this type of cab

The only time the exacting schedule was interrupted was when one unit of the convoy toppled into the flooded Towke River from an old low-level bridge. The total distance covered was 600,000 miles and the total copper concentrate payload was 22,000 tons with a copper yield worth £1.5 million. Discounting the terrain and climatic conditions, the performance of these tractors is an outstanding feat of sheer reliability—a testimonial to British commercial vehicle design and manufacture. Without fail, with almost mesmeric regularity, the vehicles have rhythmically and steadily pounded the 610-mile journey from Umkondo Mine to Messina and back.

Indifferent Roads

The Fodens are still shifting the copper concentrate from the mine. The route is mostly over mountainous country strewn with natural hazards. Altogether it consists of 192 miles of very indifferent strip roads, 77 miles of 9-ft. wide tarmac and 36 miles of gravel road which winds and dips through the bush of ranching country to the mine.

Operations begin on Monday at 8 p.m. when the vehicles leave the Fort Victoria depot of the transport company for the mine 113 miles away. On the loaded return journey the vehicles are washed, mechanically serviced, greased and have the tyres checked at Fort Victoria, a routine that occupies up to about three hours. Fresh crews then take over and at 8 p.m. on Tuesday the convoy leaves for Rutenga, which is 97 miles towards Messina. Routine checks are made on the way and again at Rutenga where a fresh relay of drivers and mates takes over. Passing through the customs at Beit Bridge, the last stage of the journey to Messina is covered by 6.45 a.m. on Wednesday. After unloading the convoy goes back.

In addition to shifting the Umkondo Mine yield of copper concentrate, Umkondo Transport maintains all supplies, including food. Units returning from Messina also pick up 44-gal. drums of molasses at the Triangle Sugar Estates for transport to Fort Victoria, whence they are distributed to the ranches. During the season about 20,000 sacks of maize are also shifted.

The Foden FGTU 8/40 tractors which are doing such a magnificent job have Gardner 8LW oil engines developing 156 h.p. at 1,700 r.p.m. They have double drive and 12-speed epicyclic gearboxes with 0.77 to 1 overdrive which give a maximum speed of 35 m.p.h. Strictly enforced axle-loading restrictions in Southern Rhodesia necessitate that units are made up of a semi-articulated 20-ton trailer with a full trailer of 10 tons capacity. The trailers were built by Trailer Manufacturing Co. (Pty.), Limited, Johannesburg.

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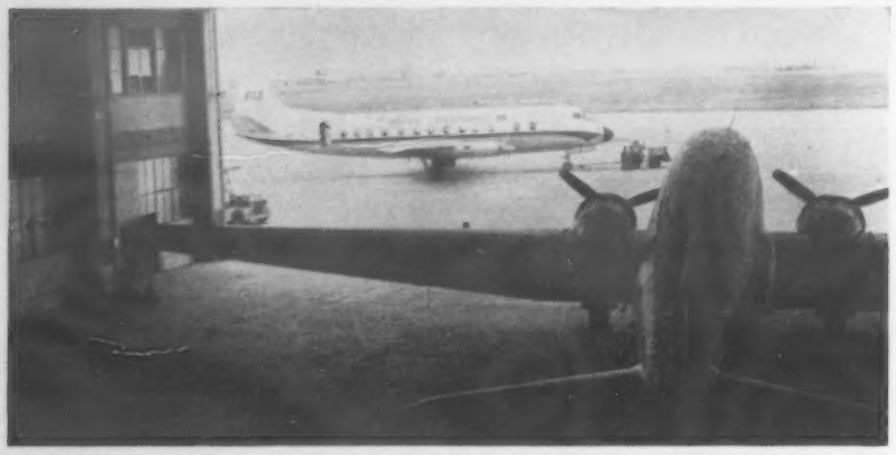
THE PROGRESS OF P.I.A.

Jet Service Inauguration

JUST over five years ago, in February, 1955, Pakistan International Airlines began operating a weekly service between Karachi and London via Cairo and last week marked a further important stage in the growth of this go-ahead national airline when it operated its first pure jet service between London and Karachi via Rome, Beirut and Tehran. As already recorded in MODERN TRANSPORT, conclusion of an agreement with Pan American Airways whereby once a week a trip-lease of a Boeing 707-320 enables P.I.A. to operate from London on a Monday morning reaching Karachi in the early hours of Tuesday. A quick turnround there and a departure at 07.15 a.m. local time (02.15 G.M.T.) gives an arrival back in London at 15.50 G.M.T. in plenty of time to take up the operation of a return transatlantic flight.

We were very glad to have an opportunity to participate in the first operation eastbound from London on March 7, not merely because it afforded an opportunity to study the Boeing Intercontinental 707 at work over relatively short stages, but also by reason of its being the first pure-jet operation by an Asian airline and the courageous venture of a rather unobtrusive member of the air transport community. For the time being the flight crews are Pan American and these will gradually be replaced by P.I.A. as its men are trained. The cabin crew has consisted of Pakistani staff from the outset, some of them having started training back in January.



A Viscount of P.I.A. being towed across the apron at Karachi is seen over a Dakota undergoing overhaul

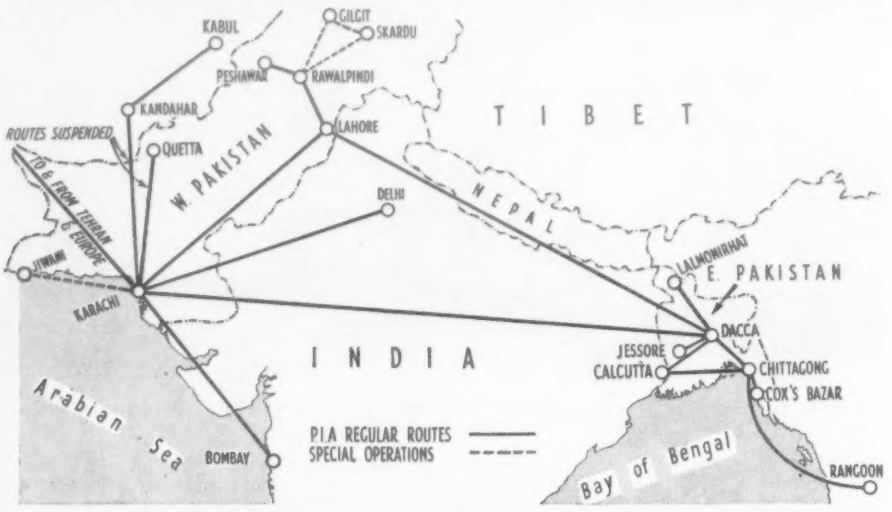
First Jet Flight

The first flight was bound to be a test for the organisation and it must be said that things passed very well. There was, in fact, a minor complication at the outset owing to the late arrival of the aircraft from New York—all transatlantic aircraft had been delayed by weather—but, despite seating arrangements having to be modified and other servicing carried out, it proved possible to recover 10 of the lost minutes and chocks were away at 10.02 hr., or 32 min. late. The aircraft was commanded by Captain Priddy and the flight plan to Rome was for flying at 25,000 ft. with a flight time of 1 hr. 46 min., for the 827 nautical miles. In fact the flying time was 1 hr. 47 min. for 851 nautical miles and the chocks-to-chocks time was 2 hr. 3 min. Most of this difference of 16 min. was due to London Airport having closed several taxi tracks and having failed adequately to indicate that fact.

One of the features of the flight was the very high degree of accuracy of the flight time forecasting. Rome was reached at 12.05 G.M.T. and the 40 min. allowance for transit time was bettered by five minutes—a very good performance. The Rome—Beirut sector was planned as requiring 2 hr. 43 min. for the 1,267 nautical miles and in actual fact the chocks-to-chocks time was 2 hr. 42 min.—the scheduled block time is 2 hr. 55 min. The time airborne of 2 hr. 34 min. gave an average speed of 493.4 m.p.h. The take-off weight of 232,500 lb. was 13,250 lb. less than the permissible maximum in the conditions prevailing at that time and the fuel load amounted to 78,000 lb. The available runway length was 7,200 ft. and 5,900 ft. of this was required.

Ground time allowed at Beirut is 65 min. and the scheduled block timing for the 842 miles to Tehran is 2 hr. 5 min. It was on this sector that, with 109 passengers, the aircraft was carrying its largest load. The flight plan was for 1 hr. 51 min. and that turned out to be the airborne time with a chocks-to-chocks time of 2 hr. 2 min., which may in turn be compared with the 2 hr. 5 min. scheduled. As on the previous sector the cruising altitude was set at 23,500 ft. Weather conditions were reasonably good as, indeed, they were most of the trip and we cruised very comfortably at the selected height without very much to disturb us.

One of the Lockheed Super-Constellations which have maintained the London—Karachi service for the past five years



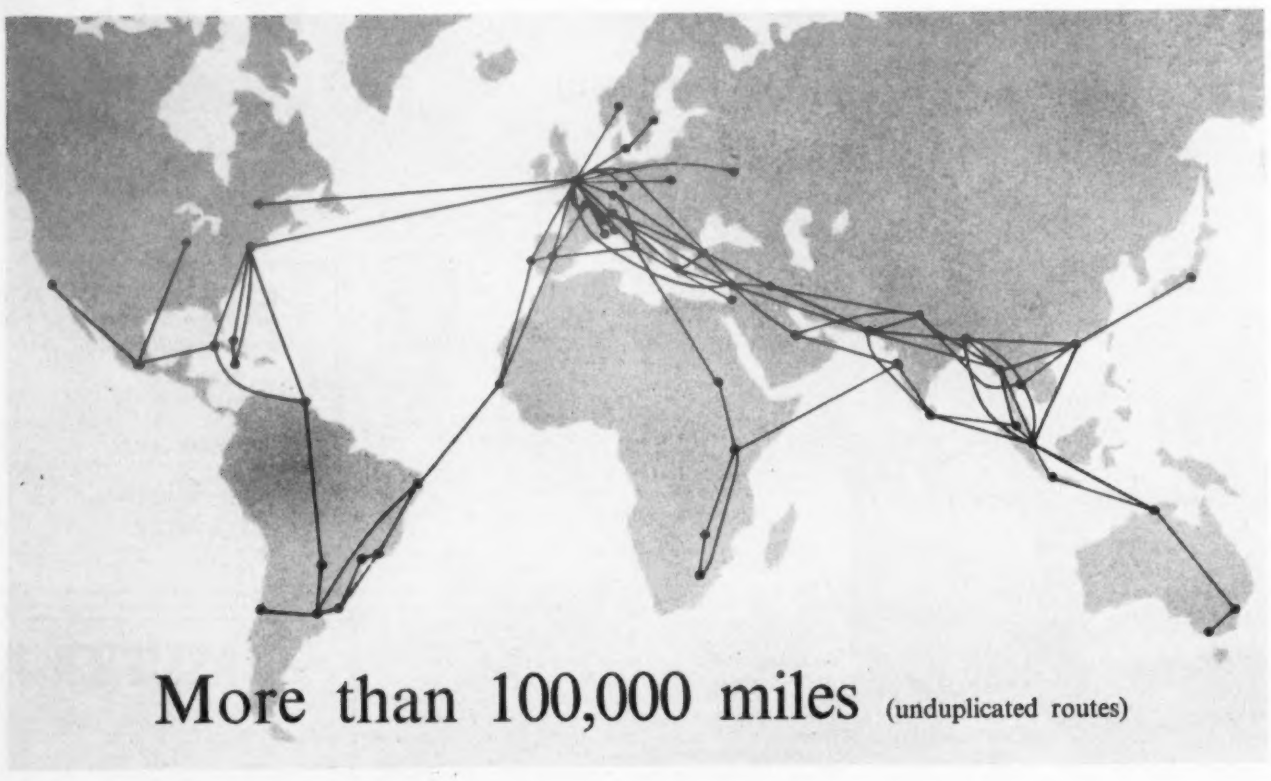
Regional routes of P.I.A. including certain special operations to Government requirements and the Kabul and Quetta services which are at present suspended

The Last Sector

The last sector, Tehran to Karachi, was the second longest of the flight, the actual distance flown being 1,042 miles. With the runway at Mehrabad Airport almost 4,000 ft. above sea level the maximum take-off weight permissible in the conditions obtaining was 240,800 lb. and there was a margin of 15,700 lb. after taking 71,300 lb. of fuel. The flight plan time of 2 hr. 11 min. was again remarkably near the actual airborne time of 2 hr. 15 min.—the block time was 2 hr. 25 min. and that compares with the 2 hr. 30 min. allowed in the timetable. There had been a slight delay at Tehran due to some brake trouble and consequently the arrival at Karachi was 36 min. behind schedule, which meant that, allowing for the late departure from London, there had only been a loss of two minutes despite the Tehran delay. This was relatively unimportant so far as the warmth of our welcome went, and alighting passengers found themselves garlanded with flowers, while Air Commodore M. Nur Khan, the managing director, who had travelled on the flight, was enthusiastically hailed by notabilities and Pakistan press representatives. The achievement was indeed a considerable one and the cabin crew did remarkably well in its first encounter with practical operation at such speeds. Our return flight was by Lockheed Super-Constellation. This type has, of course, been maintaining the P.I.A. London service for five years and will continue to be responsible for one flight a week until October.

(To be continued)

Some Comet routes in 1960



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HEAVY VEHICLE AND RAILCAR TRANSMISSIONS

Expanding Use of the Wilson System

VERSATILITY OF SELF-CHANGING GEARS PRODUCTION

LARGE-SCALE general extension of the use of epicyclic gearboxes in vehicle transmissions is a comparatively recent development, though epicyclic gears have been applied successfully to road and rail vehicles from time to time from the earliest days of the internal-combustion engine. Among early road vehicles to be fitted with epicyclic transmission gears were cars built by Dr Lanchester in 1895 and 1896, the Wilson-Pilcher car of 1901, the Model T Ford introduced in 1908 (of which a total of some 15 million was eventually produced) and the Leyland Trojan of the 1920s. Of these and a number of other early systems, the four-speed unit developed by Major W. G. Wilson for the Wilson-Pilcher car, which was also extensively fitted to fighting vehicles used in the 1914-18 war, has found a permanent place and is now in wide use in road and rail vehicles throughout the world.

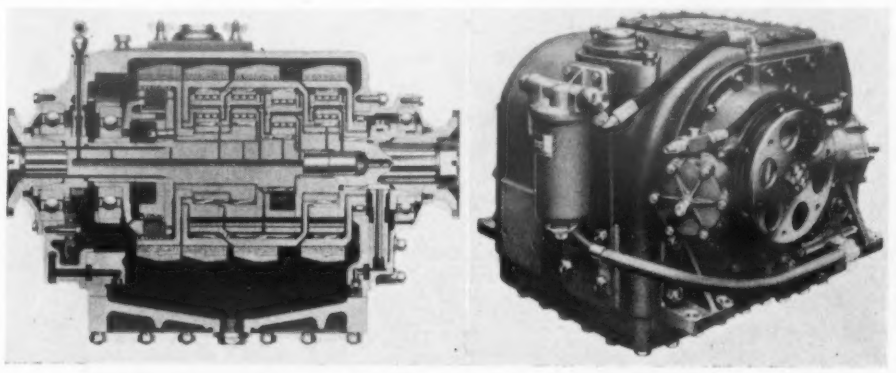
Among the reasons for the recent upsurge in popularity of this form of gearbox, apart from growing awareness of the advantages of its great robustness, long life with minimum attention and the ability to provide continuous driving torque during changes of ratio, is the comparative ease with which automatic or semi-automatic control can be arranged. Fully automatic transmission is a feature becoming increasingly desirable in urban buses, where it relieves the driver of the fatigue and strain of almost continual changes of gear in the congested conditions general in many large towns. Its application is also extending rapidly to extra-heavy tractors and off-road and constructional vehicles, in which, with sound basic transmission design, it can show considerable savings in fuel consumption and vehicle wear through selection of the optimum transmission ratio to meet continuously fluctuating demands on power output more quickly and accurately than can a human operator.

A Swiss F.B.W. Tüscher-bodied bus with elevated driving position features a 200-h.p. turbo-charged (Holset unit) F.B.W. diesel engine, 18-in. Daimler-type fluid flywheel and four-speed Wilson gearbox with electropneumatic semi-automatic control built by F.B.W. under S.C.G. licence

mechanical gearbox can, of course, be a conventional countershaft unit, but then, with simple construction, difficulties arise with gearchanging while the vehicle is on the move and there are breaks in transmitted torque during gearchanging. The advantages of foolproof gearchanging and continuous torque are gained when an epicyclic gearbox is used and the additional advantage of automatic control of gearchanging is generally easier to apply.

A potential rival system is the hydrostatic torque converter, which has substantially higher efficiency than the hydrodynamic type and is now in production for input powers up to about 60 b.h.p. Further development is likely to extend the range of this equipment into the 150- to 250-h.p. field, when its good efficiency in conversion, necessitating possibly only a two-step range changer in the most arduous applications, will be in its favour. For the more remote future, there may well be practical development of a wholly mechanical infinitely variable-ratio transmission, perhaps based on the principles evolved by Dr. Josef Beier in Germany between the wars, in which renewed American interest has been evident recently, while the extension of electric transmission, which, with hub motors as developed by LeTourneau for very large road trains and construction vehicles, has some telling advantages to the normal large-vehicle field, cannot be ruled out.

A pair of Atkinson Omega extra-heavy-duty tractors for operation in Middle East oilfields; one is equipped with S.C.G. semi-automatic eight-speed RV30 transmission and the other with S.C.G. torque converter and RV48 epicyclic gearbox



A section through and (right) exterior view of the epicyclic gearbox section of the latest heavy-duty S.C.G. RV51 torque converter four-speed transmission, which can be equipped with automatic or semi-automatic control

Various Automatic Systems

Automatic control is not of course confined to epicyclic gearboxes and there are several rival transmission systems available or under development. Automatically selected and infinitely variable ratio, within limits, is an advantageous feature, for example, of hydraulic torque converters, use of which is extensive in American and European urban buses and is increasing in heavy construction vehicles everywhere. But the innate disadvantage of the hydrodynamic torque converter—the type in general use—is its very low efficiency, particularly in conversion; this limits its useful ratio range to about 3 to 1 in simple converters and about 5 to 1 in more complicated multi-stage units.

In practice, the hydrodynamic converter is

Fully Developed System

Meanwhile, the four- or five-speed epicyclic gearbox provides a fully developed automatic or semi-automatic transmission of very high efficiency, which is currently in production covering a wide range of input powers. It can be employed alone to provide the ratio range of about 5 or 6 to 1 required in normal medium and heavy road vehicles, when it is coupled through an automatic fluid or friction clutch, or a combined fluid-friction clutch; or it can be combined with a hydrodynamic torque converter, when the effective ratio range is extended to the 12 to 1 or more necessary in some applications and the ruggedness, efficiency and continuous traction of the epicyclic gearbox is added to the smoothness and shock-damping characteristic of the torque converter.

The first practical four-speed epicyclic gearbox was designed and patented by Major W. G. Wilson around the turn of the century and was first fitted

(*Continued on page* 10)

IN TRACTION SERVICE IN 18 COUNTRIES ... Hewittic RECTIFIERS

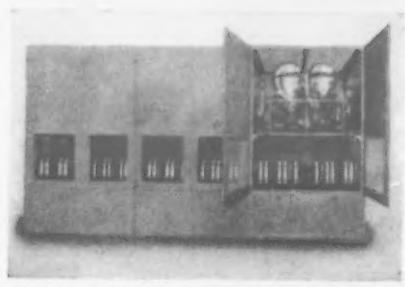
the converting plant used by the World's principal railways

BRITISH RAILWAYS
SOUTHERN REGION

One of 28 substations equipped with Hewittic Rectifiers by the British Transport Commission for the Southern Region of British Railways. The photograph shows Wimbledon substation with one wall cut away to show the two 2,500 kW rectifiers in this half of the building.

LONDON TRANSPORT RAILWAYS

The 4,000 kW Bond Street substation, equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and enclosed air-cooled transformer units. This company is also responsible for the supply and installation of all A.C. and D.C. control gear. Some 90,000 kW Hewittic Rectifiers have been supplied to the London Transport Executive.



CANADIAN NATIONAL RAILWAYS

The electrified section of the Canadian National Railways, comprising some 70 track miles in the vicinity of Montreal Terminal is supplied with D.C. by Hewittic Rectifiers in two 3,000 kW substations at Central Station and Saraguay. The photograph shows one of the four 1,500 kW equipments in service. These are designed for operation at 3,000 volts, D.C.

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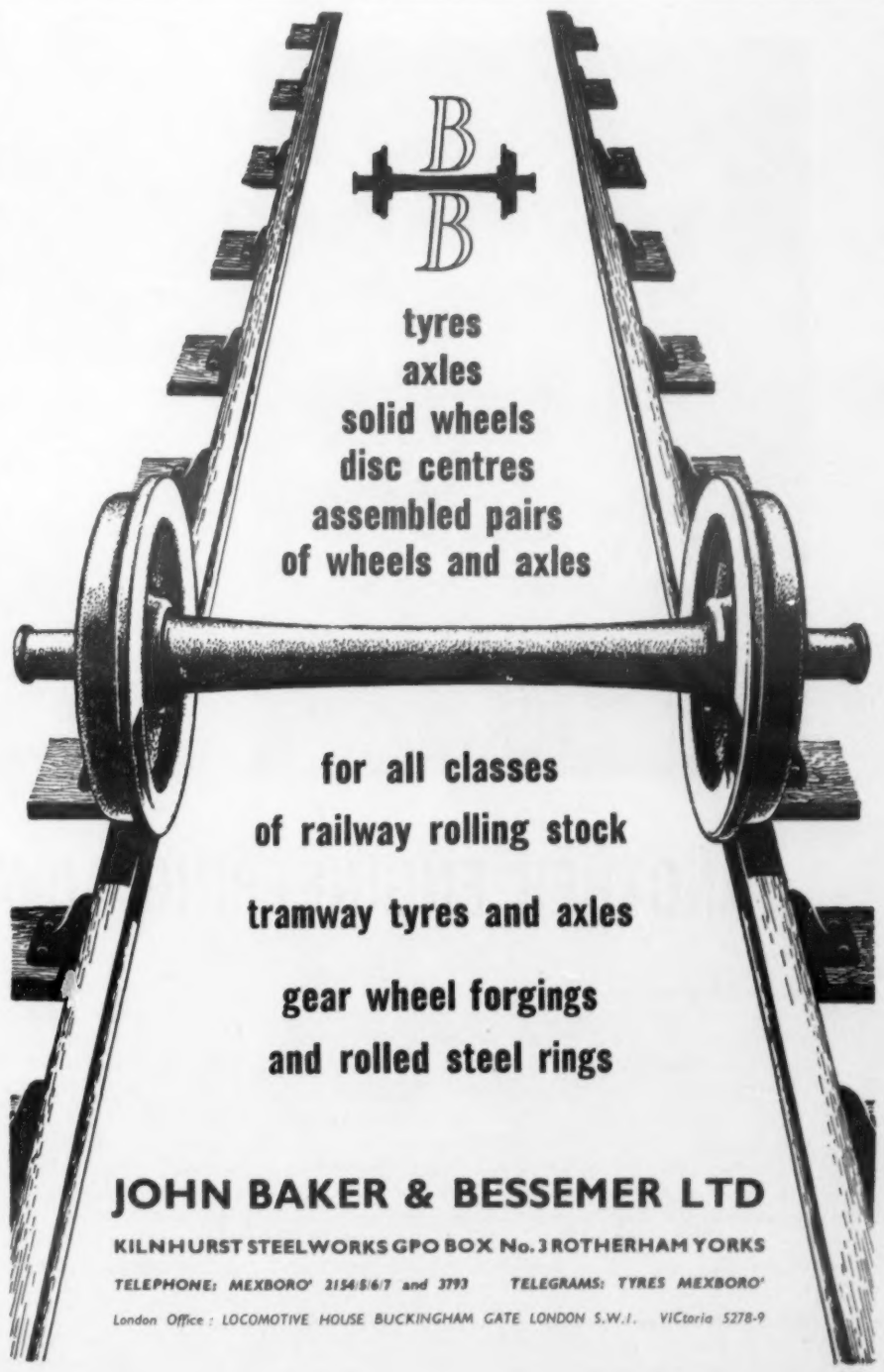


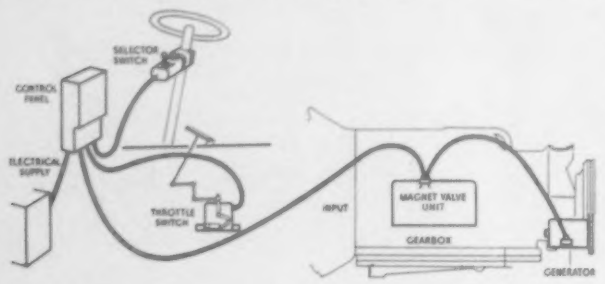
Heavy Vehicle and Railcar Transmissions

(Continued from page 9)

to the Wilson-Pilcher car in 1901. It proved a robust and comparatively trouble-free unit, with low maintenance demands and easy silent gearchanging, which features led to its use in an armoured car built by Armstrong-Whitworth in 1906 and later in first world war tanks, for the design of both of which Major Wilson was responsible. After the war, his attention was turned again to civilian pursuits and in 1928, having already engaged the interest of a number of British car, bus and railway-vehicle manufacturers in the Wilson gearbox, he founded a company—originally Improved Gears, Limited, now Self-Changing Gears, Limited—for the development and production of epicyclic gearboxes and other transmission equipment.

Widely Adopted

Following the example of Armstrong-Siddeley Motors and the Drewry Car Company, which adopted it as standard respectively in motor cars and light rail vehicles, other manufacturers were soon attracted to the Wilson gearbox and during the 1930s at least 10 makes of British cars and many railcars and light locomotives in various parts of the world were equipped with it. Its attractiveness was accentuated by the emergence at about the same time of the hydraulic coupling (or fluid flywheel), which in this country had been developed into a practical unit by (now) Fluidrive Engineering Co., Limited, though in some applications the Wilson gearbox was coupled through a centrifugal friction clutch. Interest in the system for bus transmission was shown by London General Omnibus Company and others and first Daimler and A.E.C. and later other manufacturers incorporated it in bus designs.



Diagrammatic arrangement of the basic units comprising the VS fully automatic control for four- or five-speed epicyclic gearboxes

Although the appearance of the synchromesh countershaft gearbox, with gearchanging a good deal easier than in sliding-pinion units and lower weight and first cost than the epicyclic box, led to a decline in the use of the Wilson gearbox in private cars, its great advantages in heavier vehicles brought continuing and increasing demand for buses and light railway vehicles; this eventually led to agreements for manufacture of the Wilson gearbox under licence by the A.E.C., Daimler, Guy and Leyland companies. Manufacturing licences have since been granted by Self-Changing Gears, Limited, to other companies in various parts of the world.

Range Extended

While development of transmissions for civilian purposes was interrupted by the 1939-45 war, the company produced many thousands of gearboxes for tanks and other fighting vehicles during the war years and also many marine gearboxes for various classes of vessel. Since the war, the range of transmission equipment has been considerably widened and although the most spectacular advances have been in land-vehicle equipment, including the development and introduction of semi-automatic and automatic control, great headway has also been made with oil-operated marine drives. In this field the company has a production range covering powers from 40 to 500 h.p., available with the elegant single-lever Sequent control, and has a larger unit of about 1,200 h.p. under development. Orders for marine equipment, particularly from overseas, have shown a steady rise during recent years and are still increasing.

Postwar expansion, both of the range of applications covered and of production facilities, necessitated the doubling in 1956 of the company's factory and plant capacity at Lythalls Lane, Coventry, where by 1958 some 6,000 units of about 50 different types were being produced annually. Demand for Self-Changing Gears equipment is still increasing and plans are now in hand for further expansion of productive capacity. About 60 per cent of the company's output is exported directly, while units sold to domestic producers for fitting in vehicles and vessels for export brings the total to more than 80 and perhaps as high as 90 per cent.

Semi-Automatic Control

Among the more recent developments by Self-Changing Gears, Limited, all of which have been aimed at widening the scope or improving the already high efficiency of the company's equipment, have been the introduction of direct pneumatic, electro-pneumatic or hydraulic operation of gear brakebands, eliminating mechanical linkages and thus the gearchanging (clutch) pedal and making gearchanging semi-automatic in response merely to the movement of a finger-light miniature lever or switch by the driver; the introduction of the fluid-friction coupling, which combines the smooth take-up of the fluid coupling with the more positive and efficient drive of the friction clutch; the introduction of the wide-range eight-speed epicyclic gearbox for heavy haulage vehicles incorporating semi-automatic control; the introduction of fully-automatic control for all four- and five-speed epicyclic gearboxes; the introduction of a range of hydrodynamic torque converters, which are manufactured by the company under Schneider licence; and the introduction of heavy-duty units with input capacity of up to 400 b.h.p. to suit the larger types of earthmoving and construction equipment now coming into wide use.

Features developed over the years and now incorporated in all S.C.G. epicyclic gearboxes include continuous traction during changes of ratio, smooth cushioned gearchange insensitive to driver misjudgment, balanced gear brakes and hard-wearing linings with automatic compensation for lining wear, positive pressure lubrication and efficient filtration of lubricating oil.

VS Automatic Control

Among recent developments, the VS automatic gearbox control has proved outstandingly successful and has been the subject of dramatically increased demand during the past year, mainly for application in urban buses in many parts of the world but also in heavy aircraft-towing tractors and construction-site vehicles. The VS control is an electromechanical device comprising a speed-sensitive generator driven from the gearbox output shaft, a multi-position switch linked to the accelerator pedal, a magnet valve unit, a control panel and a gear selector. The units combine to provide a continuously precise register of vehicle speed and power requirements and to select automatically the gear most appropriate to prevailing conditions. One of the embarrassing features of automatic control—the selection of too high a gear under no-load conditions to provide good engine braking on downgrades—is overcome in the S.C.G. system by using a standard five- or six-position gear selector, use of which by the driver positively overrides automatic control.

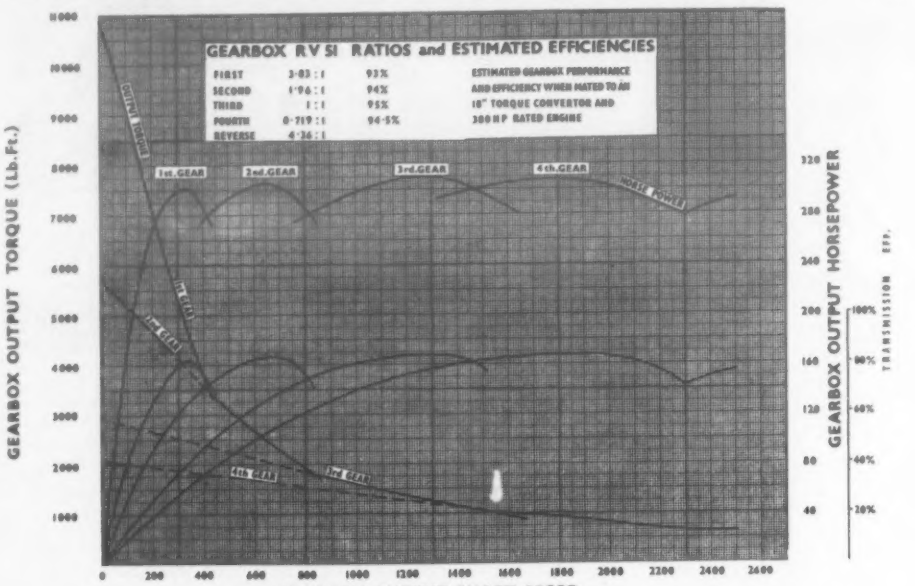
VS control, which can be applied to practically all direct air- or oil-operated epicyclic gearboxes, has been found to give a very consistent pattern of behaviour; it is simple to install and requires virtually no maintenance. Its excellent performance in a number of road and rail vehicles since its introduction four years ago and the reports of reduced driver fatigue, increased passenger comfort and greater transmission life, without increase of fuel consumption, have done much to overcome the suspicion of operators that automatic control meant increased complication and probably costly maintenance. Even so, most of the current bulk orders for VS control are coming from overseas, including a repeat order for 60 sets for the Department of Government Transport, Sydney, Australia, and one for 200 from Omnibus Metropolitanos S.A., Cuba, for equipping Leyland-M.C.W. buses. Large numbers have also been supplied for New Zealand, Israel, Belgium and the Netherlands. But home demand is also growing and more and more units are entering service with London Transport.

Wide-Range Eight-Speed Gearbox

The S.C.G. RV30 eight-speed epicyclic gearbox, which was introduced in 1956 and first fitted to the prototype Leyland Buffalo heavy three-axle goods chassis, is a remarkably fine piece of equipment ideally suited to the requirements of fast heavy trunk haulage or of the type of operation where vehicles are worked partly off and partly on the road. It is currently fitted to Atkinson Omega and Scammell Super-Constructor heavy-duty chassis. The RV30 gearbox consists basically of a four-speed-and-reverse epicyclic unit coupled with a two-speed epicyclic range-changing unit, providing eight forward and two reverse ratios incorporating direct air control. The ratio range covered is from about 10 to 1 to about 0.7 to 1 overdrive, or the equivalent, in well-graded steps.

Control is semi-automatic by air-pressure operation in response to movement by the driver of a single finger-light lever, movements in one direc-

(*Continued on page 27*)


GEARBOX RV 51 RATIOS and ESTIMATED EFFICIENCIES
FIRST 3·03 : 1 93%
SECOND 1·96 : 1 94%
THIRD 1 : 1 95%
FOURTH 0·719 : 1 94·5%
REVERSE 4·36 : 1
ESTIMATED GEARBOX PERFORMANCE AND EFFICIENCY WHEN MATED TO AN 18" TORQUE CONVERTER AND 380 HP RATED ENGINE
1st. GEAR
2nd. GEAR
3rd. GEAR
4th. GEAR
GEARBOX OUTPUT TORQUE (Lb.Ft.)
GEARBOX OUTPUT HORSEPOWER
TRANSMISSION Eff.
GEARBOX OUTPUT SHAFT SPEED

Performance curves and overall efficiencies plotted for the RV51 transmission, comprising four-speed epicyclic gearbox and 18-in. torque converter, operating with a diesel engine rated at 380 b.h.p. at 2,100 r.p.m.

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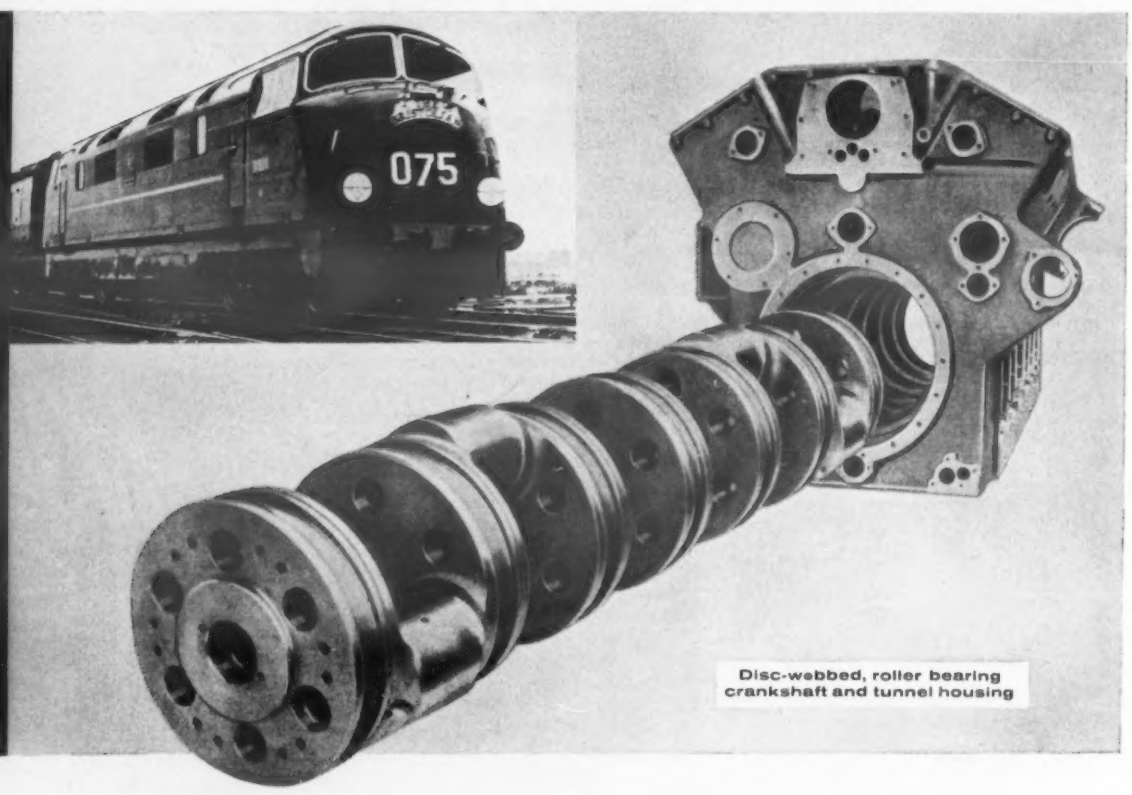

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Since the cylinder bore and stroke, and the majority of components, are identical in all models, spares stocks are considerably reduced. Servicing also has been greatly simplified because much thought has been given to accessibility and the removal of components. And the engines are suitable for both hydraulic and electric transmission.

World-wide application. Maybach rail traction diesel engines are in service all over the world and have built up an unsurpassed record for reliable and economic operation. Bristol Siddeley Maybach diesels power the new diesel hydraulic locomotives of British Railways Western Region and *over 200 engines have already been ordered by British Railways alone.*

For further information please write to: Maybach Sales Manager, Bristol Siddeley Engines Limited, PO Box 17, Coventry, England.

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BRISTOL SIDDELEY ENGINES LIMITED

PARTNERSHIP AND THE EVOLVING COMMONWEALTH

Examples in the Field of Air Transport

By BASIL SMALLPEICE, Managing Director, British Overseas Airways Corporation

THE whole concept of an evolving Commonwealth, with autonomous national entities developing in partnership is, historically speaking, new both in political theory and practical application. The independence of Ghana and Singapore; the forthcoming autonomy of Nigeria; the conferences on Kenya and Cyprus; the Monckton Commission on Nyasaland—all these are manifestations of a deliberate political policy based upon the principles of partnership. It is a concept and a policy that has been made at once necessary and possible by the unprecedented increase, during the last three decades, in facilities for communication, both ideological and physical, among which air transport is an integral and all-important part.

The principle of Commonwealth partnership in the air was born in 1934. In that year Imperial Airways, under the chairmanship of Sir Eric Geddes, entered into a partnership agreement with Qantas Empire Airways, under which the participants each became responsible for a section of the international route to Australia. This was followed, in 1945, by the Springbok partnership formed between the British Overseas Airways Corporation and South African Airways. The form of this partnership was a new development, each associate being responsible for operating over the whole route.

Political Origin

Today, and in the light of the developing situation within the Commonwealth, it is interesting to reflect that the original concept of the Springbok partnership was political in origin, arising from the discussions of July, 1945, of the Commonwealth Air Transport Committee, and was designed primarily to foster Empire unity and development. Its subsequent and very considerable commercial advantages were the result of, rather than the reason for, the conception and implementation of this agreement. In the following year, 1946, the existing agreement with Qantas Empire Airways was extended and developed along the same lines of parallel operation from end to end, and set the future pattern for partnership with major operators such as Trans-Canada Air Lines and Air-India International.

It is an established rule that a high frequency of service generates traffic in all forms of commercial transport. In the air, a partnership in parallel operation means that each partner can sell double the number of flights at their respective ends of the route with all the ensuing benefits of increased traffic. In addition, considerable and growing economies are achieved by the elimination of duplicate ground staffs and equipment. Another and substantial benefit to be derived from such an agreement is that if one partner has to withdraw, for any reason, a large proportion of its fleet from service, then the other can help to maintain the traffic from its reserve capacity. For instance, when the Comets had to be withdrawn from service in 1954, both Qantas and South African Airways were able for the necessary period to maintain the service with their Constellations.

Less Obvious Advantages

Apart from these evident commercial advantages, there are other non-commercial aspects of the partnership development which are not so immediately apparent. Today, in this age of rapid communication, national air transport services loom largely in the minds of governments. Through its fleets, its personnel and its services air transport performs a quasi-ambassadorial function and it is not too much to say that the possession of a national airline, in many instances, is taken as the outward expression of autonomous nationhood.

At first sight this might seem to be an overstatement, but it should be remembered that one of the earliest objectives that the Government of Ghana sought to achieve, after the acceptance by Ghana of its independence within the Commonwealth, was that a national airline for Ghana should be created out of part of the existing West African Airways. This was an objective which, in itself, Ghana would have been unable to achieve, and approaches were made to a number of international airlines. Now, under a partnership agreement with B.O.A.C., the corporation operates and maintains trunk services, under charter, between that country and the United Kingdom on behalf of Ghana Airways. Without some such arrangement, the operation by Ghana of a regular service to London would be uneconomic; the price of a single aircraft might be in the region of £2 million, the capital and running cost of the necessary maintenance facilities would be formidable, and Ghana's share of the traffic on the route would warrant the use of only 1½ or perhaps two aircraft.

Confidence and Understanding

Comparable services are maintained by B.O.A.C. on behalf of East African Airways, Central African Airways and Nigerian Airways, and the corporation is prepared to consider extending this type of partnership arrangement to other Commonwealth countries. In this way B.O.A.C. gives much assistance to Commonwealth airlines, placing at their disposal the benefit of its long operational experience, its ground facilities, and its managerial and technical "know how." Confidence and understanding are established through the habit of mutual discussion and solution of joint problems at working management and executive levels. For in every partnership agreement is implicit the theory and practice of mutual help, whether in the case of equal partnership, as with Qantas and South African Airways; or in the provision of services which would otherwise be uneconomic for the other party concerned, as with Ghana and Nigeria.

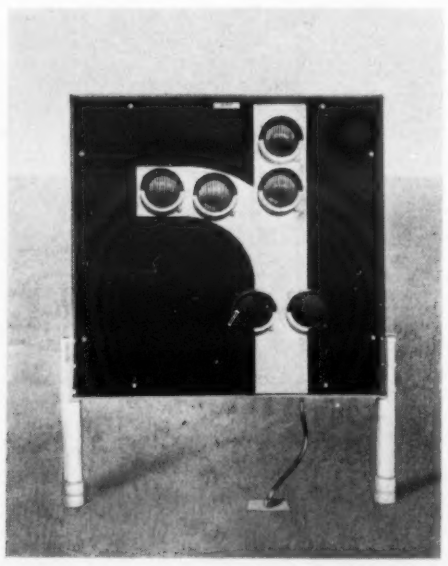
The value of this co-operative approach is hard to overestimate, particularly when it is remembered that, in the nature of the service, there is physical as well as intellectual contact with the homelands of the respective partners. The whole concept of an evolving Commonwealth, first expressed in the Statute of Westminster in 1931, has developed during the last 30 years far beyond the immediate ideal of the statesmen who embodied in that legislation the idea of self-governing autonomous communities, in no way subordinate to one another but bound by a common loyalty to the Crown. It is a development largely due to the increase in facilities for communication, in which B.O.A.C., and Imperial Airways before it, can claim to have played a considerable—indeed, vital—part. Today and in the future, the political and social evolution of the Commonwealth must become ever more related to and dependent upon the development of the commercial and industrial partnerships.

As a public corporation, B.O.A.C. is well qualified to play its part in this social adventure without historical parallel. To the men and women in it, by definition and by vocation concerned with the development of physical communications, the theory and practice of Commonwealth airline partnership is infinitely more than a technical or a commercial objective: it is the practical implementation of an ideal.

TAXI ROUTE INDICATOR

New G.E.C. Airport Equipment

LATEST addition to the range of airport lighting equipment made by the General Electric Co., Limited, of England, the ZA610 taxi route indicator, uses lights to show pilots which route to take when taxi-ing up to a junction. The first indicator to be installed—at the modernised Palisadoes Airport, at Kingston, Jamaica—serves



an exit taxiway which divides into two (as may be seen from the illustration), but the ZA610 can be made with a layout to match any shape of junction, in any location and with as many alternative routes as required.

Sited at the side of the taxiway, the indicator consists of a black panel about 3 ft. square with the junction pattern marked in white. Lights set in each arm of the junction diagram indicate the route to follow. The Palisadoes indicator has two red lights in the lower arm. These lights hold the

(*Continued in next column*)

TRAFFIC AND SAFETY

World Meeting in Nice

SCHEDULED to be held at Nice, France, from September 26 to October 1, 1960, is the fifth International Study Week in Traffic Engineering, a world-wide gathering of traffic and highway engineers, senior police officers, scientists, road safety specialists and officials of motoring organisations, who will meet to present progress reports, exchange ideas and study the solution of two problems common to both hemispheres—the improvement of road traffic conditions and of the standards of safety on the roads. Matters to be discussed include the influence of speed and speed regulations on traffic flow and accidents; visual aids to driving on urban and rural roads; traffic and parking needs generated by building development; the problem of capacity in road planning; problems of intersection design; economic losses due to traffic congestion; and individual and mass transport in urban areas.

The study week will be followed, from October 3 to 5, by an International Road Safety Congress, at which road safety propaganda campaigns, including the comparative merits of short- and long-term campaigns; education of road users—driving tuition, refresher courses and training of school-teachers; and research activities, including accident-proneness, motivation research and standards for seatbelts are among the subjects for discussion.

Copies of the complete programme for both meetings and details of the administrative and social arrangements will be available in February from the World Touring and Automobile Organisation (OTA), 32 Chesham Place, London, S.W.1.

(*Continued from previous column*)

aircraft until the way is clear. The red lights then go off and two white lights come on in the arm indicating the appropriate route.

For durability, the panel is made of glass-fibre polyester resin incorporating the black colour, with the white route marking—of similar material—inlaid. The indicator lamps (6 volt 36 watt) with their lenses are on hinged mountings to facilitate replacement. Each pair of lamps is fed by its own transformer and is controlled remotely by a selector switch in the control tower. Low output voltage allows lamps to be replaced while the circuit is live. The legs supporting the panel have weak joints so that an aircraft, if it accidentally hits the indicator, will snap it off and suffer little damage.

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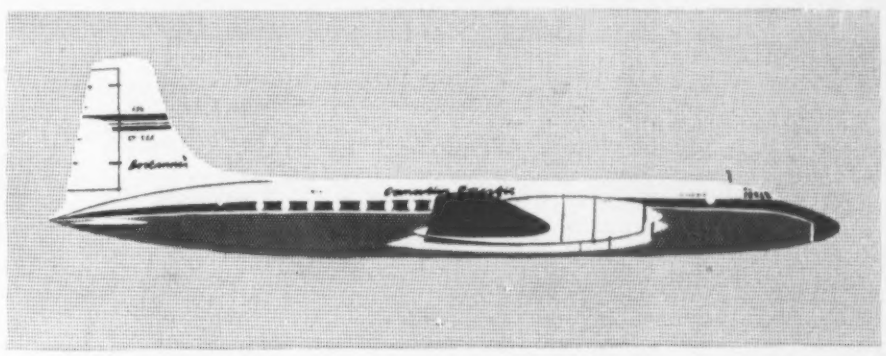

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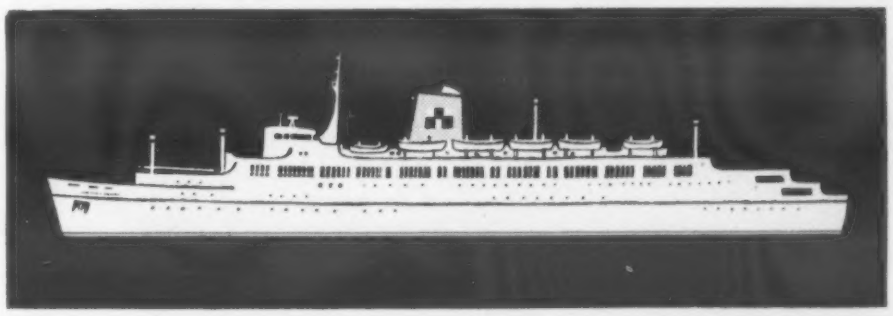

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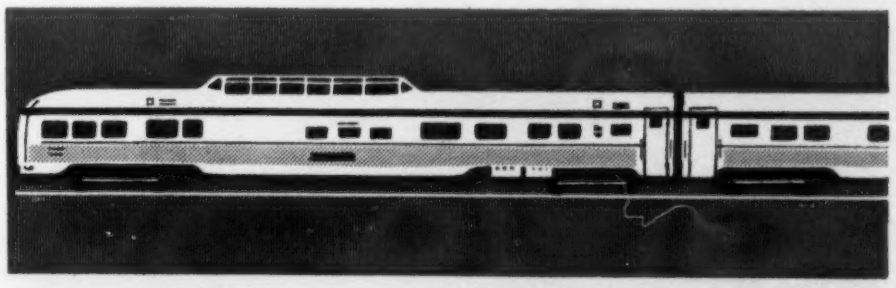

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THORNYCROFT

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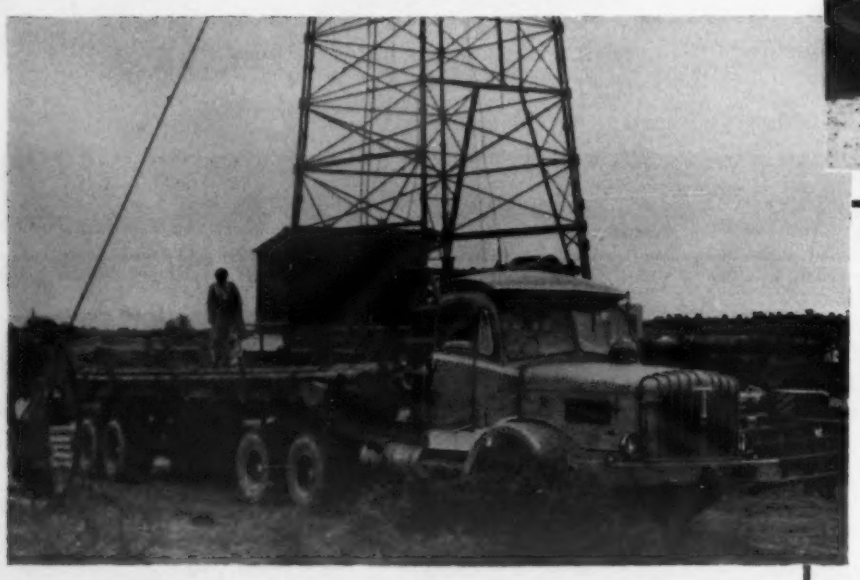
CANADA
One of the "NUBIAN" 6 x 6 with Pyrene Company's Mark 6T Crash Tender body for the Department of Transport (Civil Aviation), Canada. (*Above*).

TURKEY
"TRUSTY" Tractor with Dyson semi-trailer for Halliburton operations in Turkey. Similar vehicles have been ordered for Yugoslavia and Libya. (*Left*).

"MIGHTY ANTARS"—Britain's biggest tractors—are in use on Civil Engineering projects in Iraq, Venezuela, Borneo and Australia.

AUSTRALIA
A 4 cu. yd. Mobile Concrete mixer on a "TRUSTY" 6 x 4 chassis. (*Right*).

PAKISTAN
Typical of many "BIG BEN" oil-field trucks as supplied to leading Oil Companies throughout the World. (*Below*).



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PNEUMATIC-TYRED TRACKWAYS

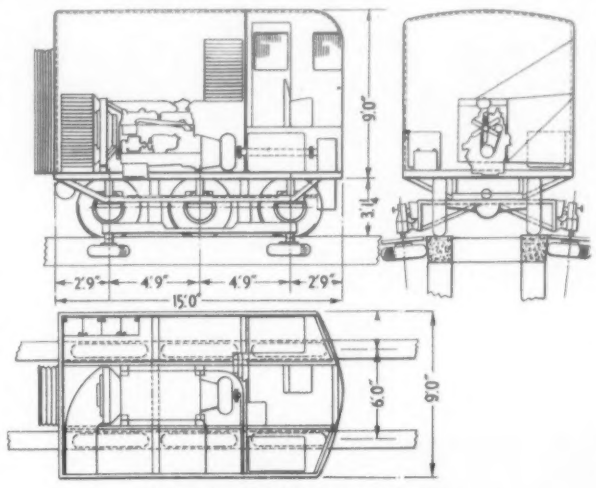
*2—The Rhodesian Pneuways System**

INTENDED FOR UNDER-DEVELOPED COUNTRIES OR FOR URBAN USE

UNDERDEVELOPED countries have for long felt the need of a transport system suitable for opening up districts where financial justification for railways or major roads is not warranted. The Pneuways system developed in Rhodesia has been evolved in the hope that it will be welcome on all sides as an important factor in economic development, since it has the merits of low capital cost and adaptability as regards speed and loads. Furthermore, the growth of cities is presenting the transport engineer with the ever-increasing problem of getting the working population from the periurban or dormitory areas to offices and factories.

Fundamental Principles

At peak periods, roads are already congested beyond tolerable limits and as it is no longer economically feasible to extend the boundaries of the areas given over to roads in major cities, the answer has to be sought elsewhere. Since the Pneuways system can be elevated to utilise the space above roads, thereby increasing their carrying capacity, it offers a solution to the problem at low cost — indeed, at a cost claimed to be lower than any other system. In the main, it is a combination of orthodox railway and road methods of transport. It is not designed to replace or compete with existing rail and road transport systems, but rather to supplement those already in existence; nevertheless, it can, it is thought, provide a relatively inexpensive and satisfactory link in areas not at present served by any form of transport and where the cost of providing and maintaining orthodox facilities would be uneconomic.



A diesel-engined Pneuways tractor

The Pneuways transport system comprises three main features:

(*a*) A specially designed low-cost track or roadway manufactured from easily and cheaply obtainable materials, which are not subject to great wear and thus require little or no maintenance.

(*b*) Prime mover or motive-power units, either diesel, petrol or electrically propelled, manufactured from standard transport vehicle sub-assemblies and therefore readily obtainable at low cost.

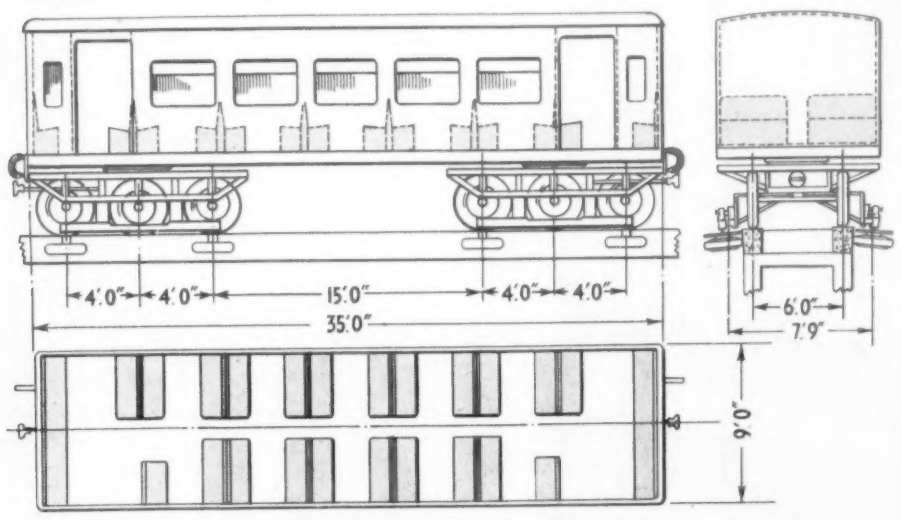
(*c*) Passenger or goods carrying vehicles, also manufactured from readily obtainable materials and transport vehicle sub-assemblies, and, which can under certain circumstances be used as normal road transport vehicles.

Trackway

The Pneuways track consists of a pair of beams, each being approximately rectangular in section but having the outer face provided with an outward batter some degrees from the vertical. The beams are laid parallel so that the distance between the outer faces of the beams is kept to a constant suitable gauge, 6ft. being a convenient dimension. The beams may be manufactured of concrete, either pre-cast or cast in situ, pre-stressed, post-tensioned or of conventional design. They may also be of steel or other materials. The top face of the beam is used as the running surface for the main load-carrying wheels, and if considered desirable, may be provided with a shallow recess to accommodate a thin layer of bitumastic material to provide a wearing surface and improve adhesion.

The guide wheels which retain the vehicle in its proper course run on the sloped outer face of the beams and are set at an angle to the horizontal in order to present the wheel normal to the face of the beam. The beams are carried clear of the ground, varying from a few inches to any desirable height, by means of bored or driven-reinforced concrete piles or piers, or alternatively on concrete or metal frames spaced at intervals varying according to the loads to be catered for. Each brought to the desired level and capped by means of a concrete or metal lintel to which the beams are attached.

The use of piles or frames allows for gradients to be reduced or even eliminated in normal undulating country simply by extending the carrying piles to a suitable level when crossing depressions.



A trailer car on 12 carrying wheels

Where a watercourse is encountered, the piles can be so spaced as to jump the gap, or, in the case of a major river, carried into and anchored to the stream bed as bridge piers. Similarly, this method of construction can be utilised in built-up areas and the Pneuways becomes an elevated system carried along the berm of roads, astride sidewalks or above centre islands, allowing unhindered passage of normal vehicular traffic underneath. There need be no wastage of road space, since the area underneath the track can be used for the accommodation of services, i.e., water, sewerage, telephone mains, etc., and, say, a cycle track or parked vehicles. The designers believe that, particularly for elevated transport, the costs are about one-third of those of any conventional railway.

Vehicles

The prime movers and the load-carrying vehicles will, it is proposed, consist of one or more interconnected free swinging bogies each of three axles, fitted with pneumatic-tyred load-carrying wheels and surmounted by the bodywork. The tyres at normal maximum loading will be of a size that can continue to work with the additional weight put on the remainder or one side in the event of a burst or puncture occurring. The bogies run along the top surface of the track beams and are guided by two pairs of pneumatic-tyred wheels of smaller diameter mounted horizontally to the main load-bearing wheels and supported by means of a box girder slung parallel to the bogie frames. This box girder is attached to the main bogie underframe at two or more points by triangular members and is free to pivot on trunnion pins. The initial pressure of the guide wheel against the beam is pre-set by means of the limiting stops and thereafter the control of this pressure is exercised by a pneumatic cylinder and ram.

All the pneumatic cylinders throughout the train of vehicles are connected, by flexible pipe, to a common air compressor driven off the primary drive of the towing vehicle. The compressed air pressure, therefore, is proportional to the speed; the higher the speed the greater the pressure in the cylinders and consequently the higher the bearing pressure of the guide wheels on the beam with resultant increase in safety. In peculiar conditions such as extreme side winds, the initial pressure of the cylinders can be controlled by a simple adjustment to the blow-off valve of the compressor by means of a lever under the driver's control.

Use of Vehicles on Highways

The trailing vehicles, if required, may be modified to run on smooth road surfaces. This will add a little to the cost and tare weight of the vehicle and is only justified where conditions of service make it imperative. This is achieved in the following manner. At the terminal station, the guide wheel carrying assembly is dropped by releasing the triangular carrying members from the bogie underframe; at the same time the bogie is locked in its fore-and-aft position. The time necessary for this operation is estimated as not being more than 3 min. At the same time the weight of the front end of the vehicle is supported on hydraulic jacks and the complete front bogie assembly rolled out of the way by releasing the turntable centre pin. A towing vehicle is backed into place and coupled by means of a standard articulated vehicle coupling. The whole unit then becomes a normal articulated unit as employed for road freight distribution all over the world.

Prime Movers

Prime movers may be either separate motive power units working singly or coupled together as multiple units, or each load-carrying vehicle can be individually motivated. Motive power units can be designed to suit all conditions of service, i.e., the haulage of heavy loads at low speeds and, conversely, light loads at relatively high speeds. At present designs exist for a medium speed range general-purpose type motive power unit for both

(*Continued from page* 14)

* The first portion appeared March 5.

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Rhodesian Pneuways System

(*Continued from page 13*)

passenger and goods haulage and powered by a 150-h.p. normally aspirated diesel engine fitted with a torque converter to facilitate starting and as generally supplied to heavy vehicles in the earth-moving trade. From the torque converter, power is transmitted through a vertically-mounted transfer box is which a reverse gear covering all speed ratios may be incorporated, although this is not considered to be necessary since motive power units would normally be turned at destination so that all running is done in one direction. From the transfer box the transmission drives three heavy-duty transport vehicle back axles through carden shafts and differentials.

Compressed air brakes would be fitted to all wheels, both on the tractor units and trailing vehicles, and operated by means of a driver's brake valve and inter-vehicle flexible air pipes, compressed air being provided by compressor mounted complementary to the main engine. The whole unit would be covered with a light metal, stressed skin aluminium or fibre glass body totally enclosing the power plant; it would be pierced for radiator cooling and ventilation, and have a separate sound-proofed cab for the operator.

Operating

Unlike conventional road transport, Pneuways has its own track and motive units, can therefore be permitted to haul an unlimited number of trailing vehicles. It follows that the maxium load which can be controlled with safety on the open road can be exceeded many times over the Pneuways system with the same engine power output as used by the road vehicle, and since units would be operating on a defined track, these loads could be handled with the minimum of operating staff, or even in exceptional cases without any operating personnel whatsoever, train movements being controlled by electrical relays.

The single unit 150-h.p. Pneuways tractor is designed for general purpose duties and would normally operate in pairs coupled back to back and under the control of a single driver. In a suburban application, two such units would be able to haul up to five double bogie trailer units, allowing for the movement of 380 passengers seated and at approximate maximum speeds of 45 m.p.h. on the level. Similarly, for the haulage of goods at lower speeds, say 25 m.p.h. maximum, two such units could handle approximately 90 tons gross or 65 tons of payload. Designs are in course of preparation for tractor units having 270-h.p. normally-aspirated diesel engines or 350-h.p. turbo-charged diesel engines. In the former case the haulage capacity of a twin tractor unit would be nine trailer units or 684 seated passengers, and in terms of goods vehicles, approximately 99 tons of payload. Similar figures for the latter type of unit would be 11 trailer units or 836 seated passengers and alternatively 135 tons of disposal load.

Suburban Service

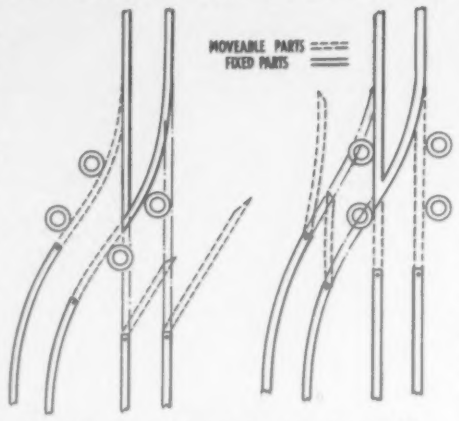
In suburban service two major factors have to be considered, namely frequency of service and rapidity of acceleration and deceleration. As to the former it is estimated that the maximum obtainable density on a single line operated in one direction would be trains at intervals of 2 min. Allowing, therefore, for the use of the most powerful units at present designed, approximately 25,080 seated passengers could be moved in one hour. As with an ordinary railway, trains can be divided at an intermediate stop and a portion of a train hauled by a single unit routed to one destination while the remainder of the train under the control of the second unit is dispatched to another destination.

Rapid acceleration and deceleration are catered for by having the stations, which are normally elevated, approached by an upgrade at the arrival end and a downgrade at the departure end. By this method the forces of gravity are employed to assist in slowing down and accelerating trains without undue strain on mechanical parts. If the track is constructed of concrete, the amount of maintenance required is negligible; it is largely confined to replacement of the bitumastic wearing surface.

In the case of motive power units and trailer units, since these utilise heavy transport vehicle sub-assemblies, no maintenance factors arise which are not normally encountered in the operation of any road haulage business, and repairs can therefore be carried out in any suitably equipped workshop in the trade, units being delivered on their own wheels.

Construction

When considering the construction of a conventional railway two important factors have to be studied, namely the high capital expenditure necessary to complete the civil engineering side of the project and the usually very high cost of obtaining wayleaves or land in built-up areas. For example, the construction of the permanent way for a conventional railway invariably involves the excavation, haulage, dumping, spreading and compacting of vast quantities of soil in the form of cuttings and embankments, as well as the construction of major and minor bridge structures, in order to obtain a reasonable gradient and so permit the haulage of economic loads.



Junction layout showing action of moveable steel plates

In the Pneuways system, since the track is supported on columns which can be lengthened or shortened in accordance with the contour of the ground, it follows that gradients and curvature of the line can be kept to the optimum economic design without the necessity for any earthworks; this factor accordingly falls away. Similarly, on the question of wayleaves, for a conventional railway these have to be acquired by the outright purchase of the necessary land and the removal of buildings infringing on the desired route, often at enormous cost. The Pneuways system, with its ability to make use of the wasted space above the public roads, reduces this factor to the minimum; hence the claim that it is the cheapest form of transport of its type.

Estimated Costs

It will be appreciated that the possible variations in the previously mentioned factors make it virtually impossible to give a fixed quotation for a Pneuways system. However, for estimating purposes it can be assumed that a mile of single Pneuways track will cost approximately £18,000 if built in normally undulating open country and therefore close to ground level, and approximately £25,000 per mile when constructed as an elevated line in built-up areas.

Similarly, owing to the fact that Pneuways tractors and trailer units can largely be assembled from readily available mass-produced road vehicle components, unlike conventional railways and monorail systems where each item has to be specially made, it follows that the vehicles will be relatively little more expensive than conventional road vehicles. For estimating purposes prices can be assumed to range from £7,000 for the standard 150-h.p. single tractor unit to £9,000 for the 350-h.p. single tractor unit and from £3,000 to £4,000 per passenger trailer coach, depending on the standard of appointments required. Prices for goods-carrying vehicles would range from £750 for a single bogie 6-ton flat to £2,000 for a double bogie 10-ton capacity box-bodied vehicle and up to £3,000 for special applications, such as dumping vehicles.

Virtues of Pneumatic Tyres

Pneumatic tyres absorb or, more correctly, prevent the generation of shocks and vibrations which are transmitted to units by steel-wheeled vehicles running on steel rails, resulting in silent running and increased passenger comfort. The use of pneumatic-tyred vehicles therefore permits of ultra lightweight vehicle construction while retaining adequate strength, and when allied to the increase of adhesion associated with the use of rubber permits of much more rapid acceleration and harder braking. In the Pneuways system the tare weight per passenger can be reduced to 300 lbs., and therefore acceleration from rest to 50 m.p.h. in ¼ mile and braking from 50 m.p.h. to rest in 150 yd. are easily possible.

The foremost consideration of any passenger-carrying organisation must be one of passenger safety. In this system, apart from the increasing guide wheel pressure on the beam as the speed rises, the installation of a Michelin indicating manometer allows the air pressure in any one tyre on the train to be ascertained whilst the train is in motion and, further, allows the tyre to be inflated or deflated as may be considered necessary, also while the train is moving. This instrument, allied to the use of metallic cord tyres, raises the safety factor vastly above that of the conventional natural or synthetic cord tyre and mileages of 75,000 per tyre should be readily obtainable.

Possible Electric Traction

It will have been noticed that no reference has hitherto been made to the question of electric traction. Bearing in mind the usage in under-developed countries where supplies of electric power are limited, all design work has naturally been confined to the use of diesel engines. Nevertheless the use of electric traction presents no great problem to the Pneuways system other than that common to all railways, namely the high capital cost of distribution. Nevertheless, the one great advantage enjoyed by conventional railways, that of using the running rails as a current return, is not available, owing to the use of concrete track. This can be quite easily overcome by the use of overhead catenary conductors supported at suitable intervals by supports bracketed out from the track supporting columns. The leading pantograph can be the collector and the trailing unit used for the return current, it is suggested by the inventors.

★

SOUTH MONMOUTHSHIRE RAIL TOUR

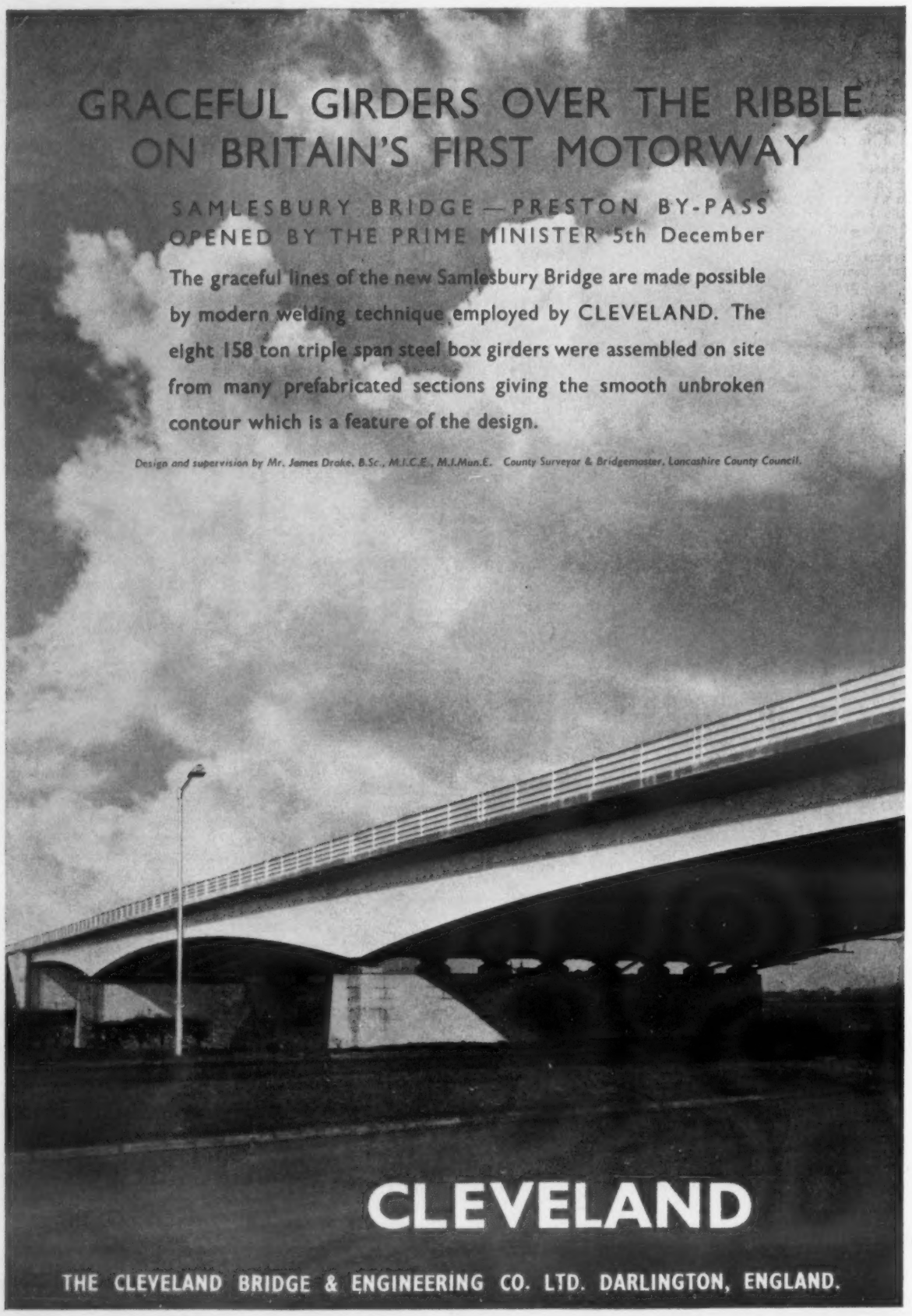
R.C.H.S. Event on May 7

A NOTABLE rail tour in South Monmouthshire, to be organised by the Railway and Canal Historical Society on May 7 next, is available to non-members, and will cover about 62 miles in Monmouthshire and 6 miles in Glamorganshire. Three sections of the route, totalling 8¾ miles, have never had a passenger service and a further 10 miles have had their passenger services withdrawn, in some cases as long ago as 1880. The train (an auto engine and three trailers) will leave Newport High Street Station at 12.50 p.m.

The route will be: Newport—Machen—Waterloo Halt — Caerphilly (reverse) — Fountain Bridge — Machen — Bassaleg Junction (reverse) — Risca — Nine Mile Point — Sirhowy Junction (reverse) — over Crumlin Viaduct—Crumlin Junction (reverse) — back over the viaduct to Penar Junction (reverse)—via Hall's Road to Hall's Road Junction — Park Junction — Newport Dock Street — Mill Street—Cwmbran Junction (reverse)—Caerleon—Maindee North and East Junctions — East Usk Junction—Uskmouth (reverse)—East Usk Junction—Newport High Street, which will be reached at 6 p.m. Light refreshments will be available from a tea trolley on the train.

Stops will be made for passengers to alight at Nine Mile Point (closed 1959), Dock Street and Mill Street (both closed to passengers in 1880). This will probably be the first passenger train to travel over the East Usk (Uskmouth) Branch. The fare, including itinerary, is to be 12s. 6d. Application forms are available from Miss K. M. Stephens, 20 Colwyn Avenue, Derby. Bookings will close on April 28.

The Societe des Petroles de Valence, in which the British Petroleum Group has a 50 per cent interest, has been granted a new permit to search for oil in the Algerian Sahara in an area covering 1,200 sq. km. near El Barga. The company already holds exploration permits covering four areas totalling 17,800 sq. km. in Algeria.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TRANSPORT AROUND MELBOURNE

Report of Victorian Board

SUPPORTING MAINTENANCE OF URBAN FACILITIES

THE annual report of the Victorian Transport Regulation Board for 1958-59 records that it is still constantly arbitrating between the extreme arguments presented by the railway representative, based on the contention that all traffic which rail can conceivably carry should be conserved to the railway as a matter of community interest, and the alternative arguments advanced by road interests and by transport users for freedom of choice between the two land transport systems.

In the Melbourne metropolitan area, the basic passenger services are those provided by the suburban electric railway system and tram and bus services maintained by the Melbourne and Metropolitan Tramways Board. These services are, with only minor exceptions, main arterial services from outer areas to central city terminals. Supplementing this basic network of predominantly publicly owned and operated services are some 148 separate bus services provided by private enterprise. These latter represent a complete network of feeder services to the suburban railway and tramway system. Alternatively, they may serve into and out of local shopping centres or provide cross-suburban services in outer areas.

One of the Victorian Railways diesel railcar sets which it is using in its fight to retain traffic on suburban and country lines. This set is at Geelong

Shorter-Distance Traffic Decline

All authorities agree that television has also had a surprising effect on evening travel. In addition, the growth of outer residential areas and the drift of population from older, inner residential areas outwards, with a comparable tendency with industrial enterprises, are changing the patterns of traffic flow in several important ways. For example, railway results show a decline in traffic from the nearer suburban stations and, similarly, on tramway board routes into the central city area. Rail travel losses are, however, being reasonably balanced by heavier loadings for the longer journeys on the suburban system, but there is no similar compensating trend on Melbourne and Metropolitan Tramways Board services which largely traverse the inner built-up area. All this has considerable significance in the offpeak periods, notwithstanding that the problem of handling peak traffic still remains.

The railways and tramways are, of course, incurring considerable losses overall on their suburban systems. Private enterprise bus services are also showing marginal results, with the problem of adequate vehicle replacements seemingly beyond solution in all the circumstances applying today. In this situation it is, in the Board's view, important to do everything possible to ensure that private enterprise bus systems operating throughout the metropolitan area and elsewhere in the state can be maintained at the best standards possible. They are providing services of considerable convenience without added community cost or subsidy in any form.

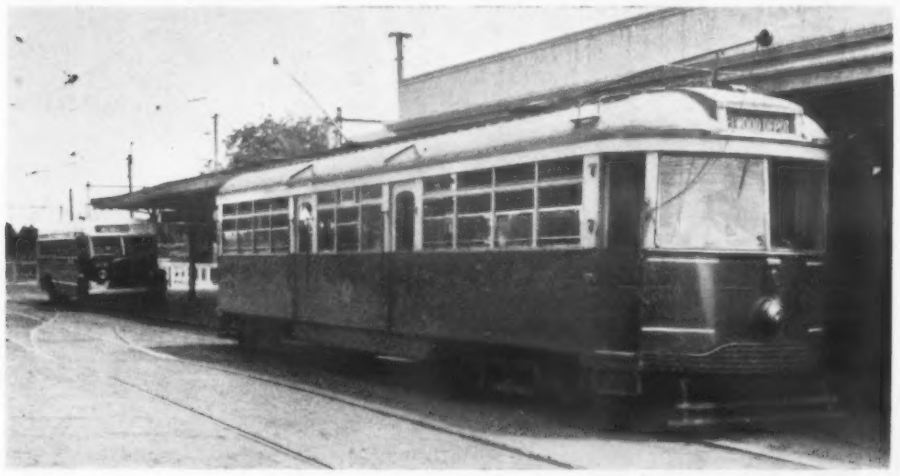
Need for Federal Action

The Government of Victoria has already acknowledged this by approving of substantial reduction in seating tax imposed under the Transport Regulation Act. It has now also approved legislation reducing registration fees for buses outside the Melbourne area to a flat rate of £7 10s. per annum, the rate already applicable to metropolitan buses.

It is pointed out that the federal body representing bus operators has for some time been pressing the Federal Treasurer for relief from the various forms of taxation payable by private bus operators, in particular seeking remission of sales tax on vehicles. Any such relief, as well as additional depreciation allowance for tax purposes to assist with bus replacement, would certainly materially assist the industry in providing the public passenger services upon which many communities rely. Undoubtedly the greatest assistance through taxation reduction would come from the Federal sphere. The industry's case for relief is greatly assisted by the fact that public bus operating authorities in Australia already enjoy the concessions which private operators are seeking. Their case is further assisted by the lead already given in New Zealand in comparable circumstances, where full exemption has been granted to private bus undertakings in respect of sales tax on new vehicles, parts, accessories and tyres and tubes. At the same time provision was also made for full rebate of the extra 1s. per gallon motor spirit tax introduced in the 1958 Budget.

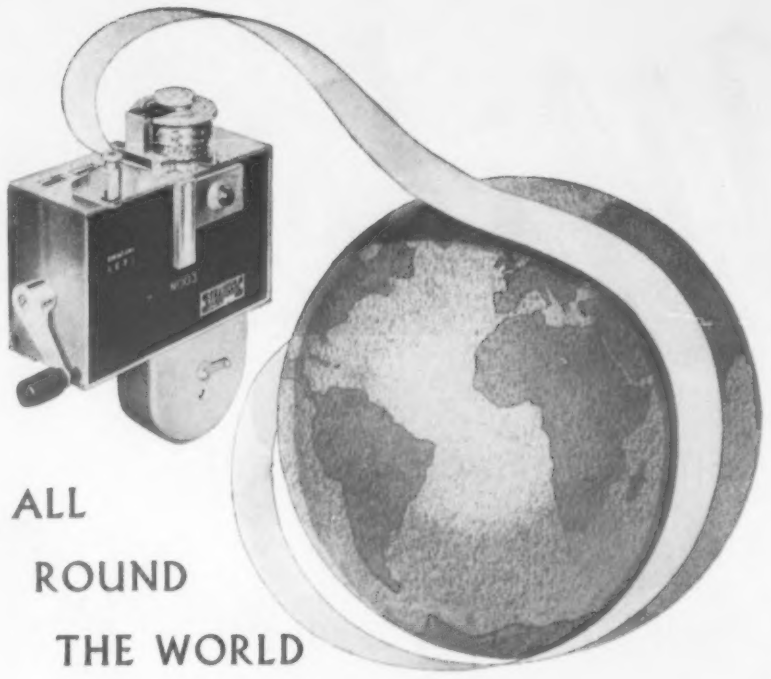
It is clear that this was done, having regard to the difficulties confronting public passenger services everywhere and in acknowledgment of the fact that, as a matter of public policy, it was important to ensure the maintenance of these services, whether privately operated and owned or provided by public authorities. In association

(*Continued on page* 34)



St. Kilda Station in suburban Melbourne with one of the Victorian Railways trams on the route to Elwood withdrawn on March 1, 1959, and a Leyland Tiger of Eastern Suburbs Omnibus Services

Typifying one of the larger independent companies in Melbourne suburban services is Melbourne Brighton Bus Lines with two main routes. This A.E.C. Reliance has a Wood body



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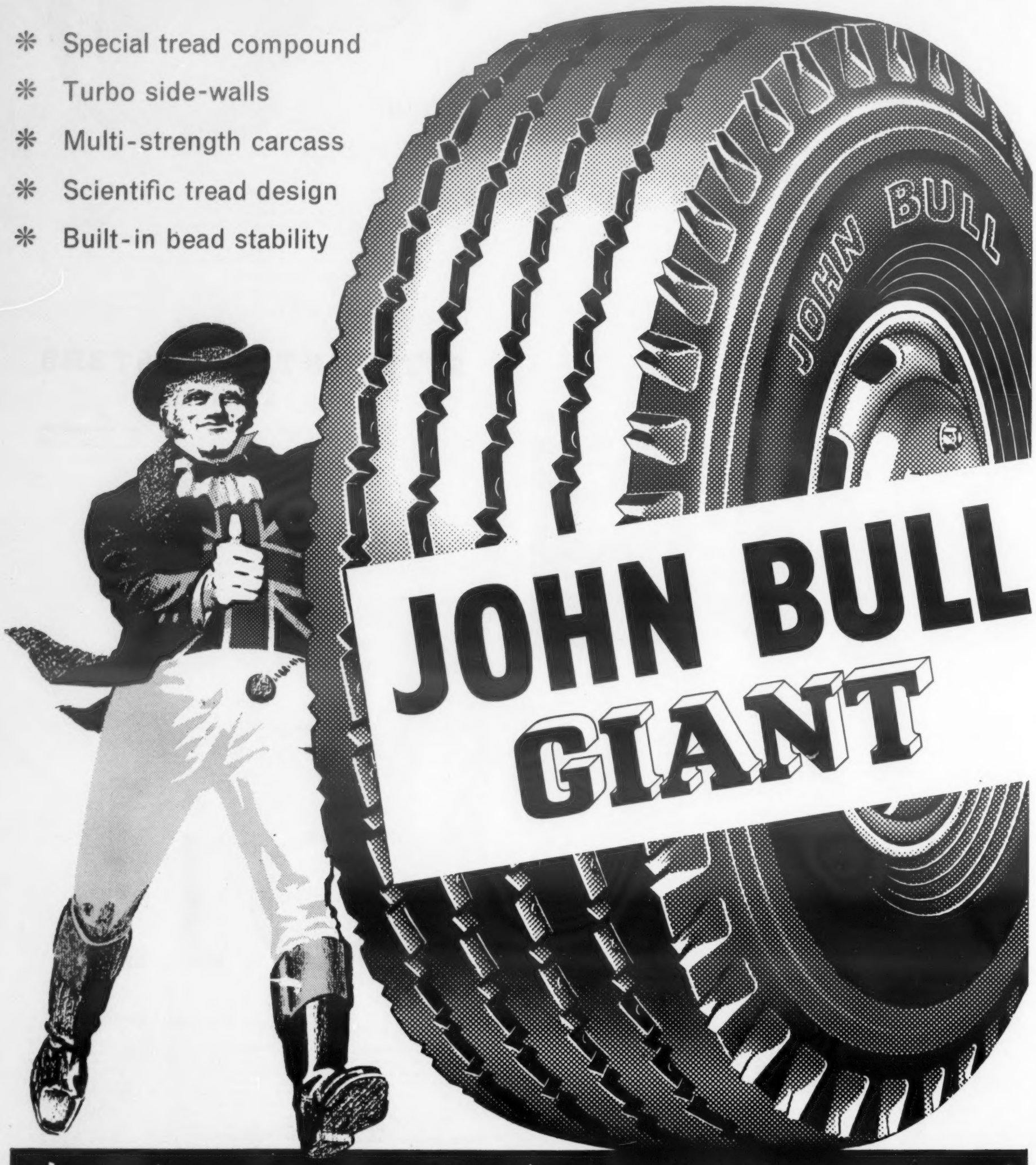

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INDIA REVISITED

1—Indian Railway Organisation

By Brigadier C. A. LANGLEY, C.B.E., M.C., Chief Inspecting Officer of Railways, Ministry of Transport

BEFORE giving impressions of my visit, it might be desirable to state some facts about the Indian Government Railways as they are today—the largest in Asia and the fourth largest in the world. They cover some 34,600 route-miles of which 16,400 are broad (5 ft. 6 in.) gauge, 15,500 are metre gauge and 2,700 are narrow gauge. There are additionally 445 miles of privately managed light railways.

The system is divided into eight zonal railways, each under the charge of a general manager; each railway is divided into a number of divisions each under a divisional superintendent who functions as an area manager. Control at the centre is exercised directly by the Minister of Railways, who functions through the Railway Board, an expert executive and secretarial body with its headquarters in New Delhi. Since the Minister is directly responsible to Parliament for the day-to-day working of the railway he has to answer innumerable questions. For example, 1,818 questions were asked in the two Houses during the year 1957-58. The railway budget also occupied much Parliamentary time, being debated for five days in the Lok Sabha and for four days in the Rajya Sabha. In addition, it is the practice for the general managers to be called to New Delhi each year to answer questions put to them by their M.P.s.

The author attended the enlarged meeting of the Permanent Commission of the International Railway Congress Association in New Delhi in December, 1959; during his visit he met Indian railwaymen of all grades from Mr K. Mathur, chairman of the Railway Board, downwards, had discussions with the chief government inspector of railways and officers of the Railway Board and revisited scenes familiar to Brigadier Langley when he was seconded to the G.I.P.R. in 1928-33 and when he returned to India during the last war

Traffic

During the year 1957-58 some 1,400 million passengers and 113 million tons of freight were carried for a cost of approximately £198 million and they produced a profit of £77 million, of which £34 million was appropriated to the depreciation reserve fund. Since 1947 there has been a remarkable increase in the traffic carried by the railways.

In the 10 years since 1948-49 freight tonnage has increased by 61 per cent and passengers carried by 24 per cent. This rate of increase continues and by March, 1961, it is estimated that the railways will be able to carry 161 million tons of freight, an increase of 42½ per cent since April, 1958. Passenger-carrying facilities are not being expanded so rapidly, owing to limited resources, but even so the railways should be capable of handling within the same period 10 per cent more passengers on the broad gauge and 23 per cent more passengers on the metre gauge.

First Five-Year Plan

When India became independent in 1947 she inherited a railway system which had been overworked almost to breaking point under the stress of the last war, and one of the major tasks of the newly formed Indian Government was to rehabilitate and develop this fine but worn-out system to meet the growing economic needs of the country. They decided to follow the example set by other countries in formulating five-year plans covering development in every sphere. The first plan was launched in April, 1951, and for the railways it necessarily concentrated on the replacement of worn-out rolling stock and equipment and the rehabilitation of other physical assets.

During the period April, 1951, to March, 1956, nearly 1,600 locomotives, 4,800 coach units and 61,000 wagons (in terms of four-wheelers) were acquired. Some 430 miles of branch lines, which had been dismantled during the war, were restored, 380 miles of new lines were opened for traffic, and 7,000 miles of track were re-laid. The most important individual project was the Chittaranjan locomotive works which went into production during this period, and had turned out 348 locomotives by the end of it. The integral coach factory at Perambus, near Madras, was also completed by the end of the period. The total cost of all these works was £318 million.

Second Five-Year Plan

The second five-year plan (April, 1956—March, 1961) is now in full swing. It was intended originally to allot £1,100 million, but owing to the limited resources and the claims of other sectors of the community the allotment to Indian Railways was reduced to £844 million. Of this amount £280 million will be found from the railway revenues, including £170 million from the depreciation fund, and the remainder from the Government's general funds. It is estimated that with this allocation the railways will be able to achieve the target quoted above. The development programme includes the following major works:

(*a*) Construction of about 842 route-miles of new railways, mainly to serve the requirements of the coal and steel industries;
(*b*) Doubling of some 1,600 route-miles of track;
(*c*) Conversion of 265 route-miles of metre gauge into broad gauge;
(*d*) Electrification of 1,343 route-miles of existing lines where density of traffic is such that steam traction cannot move all the traffic offering; it is expected that 800 miles will be completed in the period and preliminary work begun on the balance.
(*e*) Relaying of 8,000 miles of track; and
(*f*) Procurement of 2,364 locomotives, 11,575 coaching stock units and 107,250 wagons (in terms of four-wheelers).

Railway Inspectorate

The Indian Railways Inspectorate was formed in 1908 and worked under the Railway Board until 1941, when a separate cadre of officers was established and it was placed under the Department of Commerce, now the Ministry of Transport and Communications, which is quite distinct from the Ministry of Railways. The government inspectors, now five in number, are recruited from the civil engineering departments of the Indian Government Railways.

The work of the inspectorate is based on British practice, but it varies in certain material respects. The duties of the government inspectors are laid down in the Indian Railway Act of 1890 and comprise the inspection of new railways, the periodical inspection of existing railways and rolling stock, the investigation of train accidents and the holding of inquiries. Since then the inspectors have been given various additional duties which cover:

(i) sanctioning of new works and alterations to existing ones,
(ii) sanctioning the use of electric traction,
(iii) sanctioning the use of new types of block instrument,
(iv) recommending the use of new types of locomotive and rolling stock,
(v) sanctioning maximum permissible speeds,
(vi) sanctioning the running of out-of-gauge loads,
(vii) recommending the sanctioning of infringements of the structure gauge.

The Railway Board, as the authority responsible for the safe operation of the railways, actually sanctions the use of new locomotives and rolling stock, etc. and confirms the sanction given by government inspectors to the opening of new lines and electrification projects. Since 1953 the periodical inspection of open lines by government inspectors has been discontinued and this duty has been transferred to General Managers and their officers. The government inspectors continue to inspect the few company railways, and they accompany general managers on some of their inspections in order to keep acquainted with current railway working.

Accident Investigation

Accident investigation also differs from British practice. The government inspector *must* (unless unavoidably prevented) hold inquiries into every accident to a passenger train involving loss of life or serious injury, or in which the estimated cost of damage is £1,500 or over. He *may* hold inquiries into any other train accident if in his opinion the circumstances warrant such action. He does not hold inquiries into accidents to the railway staff which in Great Britain are carried out by the employment inspectors.

Members of the Press and the public are not admitted to the government inspector's inquiry, though the public are invited to give evidence. The reason given for this departure from British practice is that the evidence is not taken on oath and the inspector's conclusions may lead to prosecutions in criminal courts. Thus the public hearing of witnesses might prejudice the subsequent judicial proceedings or the witnesses themselves. Since the operation of the railways is governed by a large number of statutory rules, disobedience of which is a criminal offence, the holding of the inspector's inquiry in private becomes necessary unless the evidence be taken on oath.

In addition to hearing evidence the inspector carries out detailed investigations at the site of the accident, and where necessary initiates tests and experiments to establish the cause. On completion of his investigations he submits a brief provisional report setting out his preliminary conclusions and this is published forthwith. Thereafter he completes his full report, which is sent to the chief and other government inspectors and to the railway administration for their views and suggestions. The report is then finalised, and in the case of an important accident it is published, but without the inspectors' recommendations.

(To be continued)

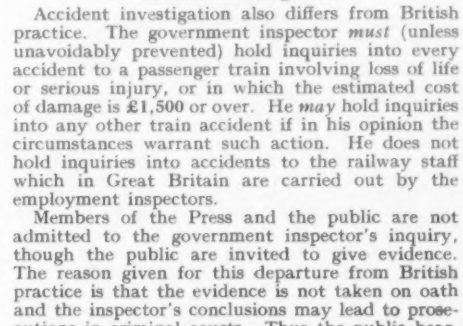
★

LONDON–JOHANNESBURG

Prospect of Regular Coaches

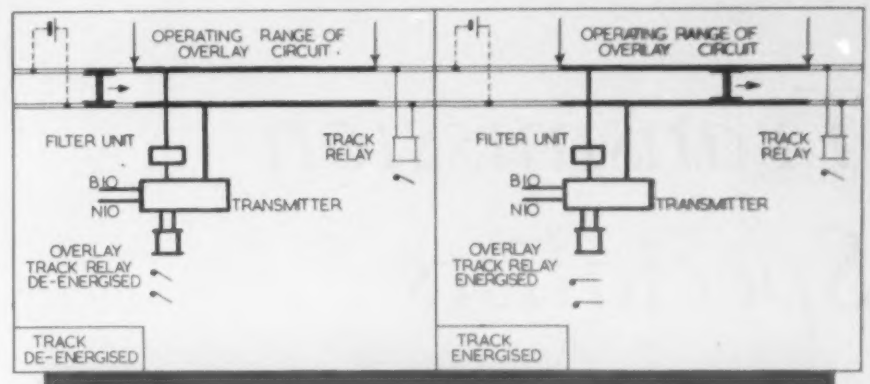
THE first London — Nairobi — Johannesburg overland coach arrived in Nairobi on January 30. The vehicle, a Bedford QL with front-entrance 24-seat body by Marshall Motor Bodies, Limited, of Cambridge, is owned and operated by Penn Overland Tours, Limited. On the return trip, which was scheduled to depart from Johannesburg on or about March 14, a full load of 24 passengers had been booked.

The outward route on the first journey had been via Germany, Austria, Italy, Yugoslavia and Greece, thence by boat across the Mediterranean and then via Egypt, Sudan to Juba, Kampala, Jinja, Tororo, Eldoret (crossing the Equator near Timboroa, some 9,000 ft. above sea level), thence via Nakuru, Thomsons Falls, and Nyeri to Nairobi. Mr. M. Wood Power, of Penn Overland, told our correspondent in Nairobi that it was hoped to operate a regular service commencing this year.



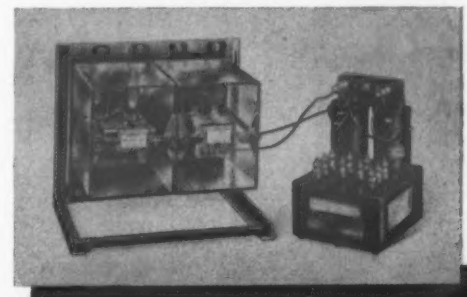
Undergoing maintenance at Nairobi

Single fares from London to Nairobi were £343 first class and £124 second class (no hotels no food). London to Johannesburg was £384 first class and £139 second class (the latter again being exclusive of hotels and food). The first run and return journeys are in the nature of an experiment. In future two coaches will combine to provide the service, one operating from Dunkirk to Athens, and the present one from Juba to Johannesburg. Passengers will be booked by train and ferry from London to Dunkirk thence by coach to Athens, then by boat from Piraeus to Alexandria, thence by train to Cairo, Luxor and Shellal, where a Nile steamer will convey the party to Wadi Halfa. Thereafter they will travel by train with sleeper accommodation to Khartoum whence, after a change, another train conveys the party to Kosta to board another Nile steamer for Juba. From Juba the Bedford QL will take the party on to Johannesburg.



AEI-GRS OVERLAY TRACK CIRCUIT

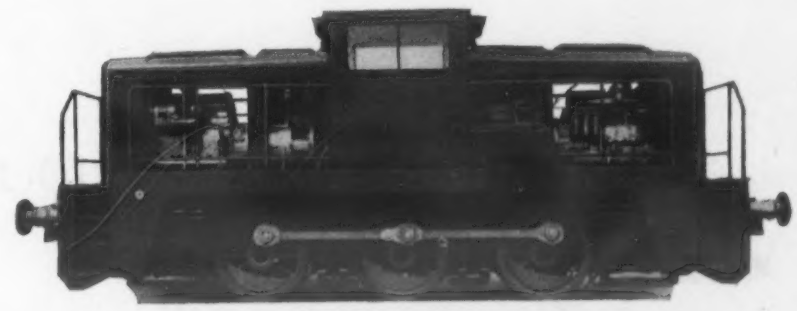
This track circuit is superimposed on an ordinary track circuit providing a short, independent track for special purposes such as level crossing warning circuits, call on signal release, etc. By the use of electronically generated 10 k-c energy it does not interfere with the working of the ordinary track circuit and no insulated rail joints are required. Only two connections to the rails are necessary. The circuit is completed by the train, the pick up range being between 80 to 120 feet.



Overlay track circuit equipment

The overlay track circuit operates from a 9–12-v battery which can be arranged for low rate charge from an AC supply.

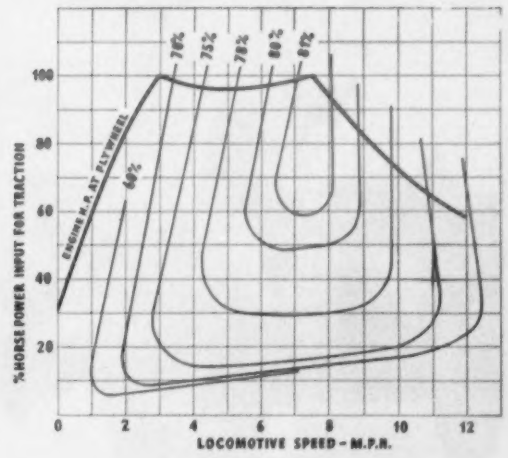
AEI-GRS LTD
132-135 LONG ACRE · LONDON WC2 · TEMPLE BAR 1141
BOMBAY, CALCUTTA, CAPETOWN, JOHANNESBURG, SYDNEY, WELLINGTON, SALISBURY, BULAWAYO
AEI-GRS LEADING SIGNALLING PROGRESS
K5/001



JANUS 400 H.P. 0-6-0 type

275 and 350 H.P. 0-4-0 and 0-6-0 types

200 H.P. 0-4-0 and 0-6-0 types



Yorkshire Engine Company has a comprehensive range of diesel-electric locomotives, and will be pleased to supply, on request, complete descriptions and specifications for any particular type.

Overall efficiency curves for diesel-electric transmission in use with these diesel-electric shunting locomotives illustrate the high part load efficiency obtained with this transmission. Efficiency exceeds 70% over practically the whole useful operating range of engine horsepower and locomotive speed.

'A GOOD PULL FROM THE START'

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Transmission Specialists

For many years
the recognised pioneers
in transmission development;
units by Self-Changing Gears Ltd.
continue to enter into service
all over the world,
in practically every form
of transport conceivable.
And from all over the world
comes the report

SATISFACTION IN SERVICE.

SELF-CHANGING GEARS LTD
PATENTEES AND MAKERS OF THE 'WILSON' GEARBOX
LYTHALLS LANE, COVENTRY

NEWS FROM ALL QUARTERS

Tram Tracks Will Vanish

Portsmouth Corporation hopes to complete the removal of tram tracks this year. The job was started in 1939, and held up by the war and since by reason of financial considerations.

Road Casualties in January

The Ministry of Transport reports that 507 persons died in accidents on the roads of Britain in January. This was 37 more than in January, 1958, and 126 (or one third) more than in January, 1959, when there was an unaccountable fall in road deaths.

Railway Survey in Sierra Leone

A length of 52 miles of railway line in the northern province of Sierra Leone is currently being photographed and mapped by Fairey Air Surveys, Limited, of White Waltham. Nearer the coast, at Pepel Island, large-scale surveys are to be made for development purposes. They will necessitate the clearing of sight lines straight through mangrove swamp under conditions of great difficulty for the ground control survey team, which will be using a tellurometer.

Western Avenue Extension

Completion of the extension of Western Avenue from Wood Lane, Shepherds Bush, to Harrow Road is expected to take several years and the town planning committee of the L.C.C. considers that a start should be made by putting in hand the Westway to Walmer Road connection without delay. Until completion of the whole scheme, traffic from Westway would proceed through existing roads, possibly on a one-way traffic system. The Royal Borough of Kensington has asked the L.C.C. to proceed with the entire scheme, but this is impossible within the road improvement expenditure presently feasible.

Token Length of Ring Road Opened

The first length of the Birmingham inner ring road was opened by the Minister of Transport, Mr. Ernest Marples, on March 11. This new highway is surfaced with dark red asphalt so that drivers will be able to follow the route without difficulty. It will include the following features: six traffic lanes, three in each direction; waiting lanes on either side for buses and other vehicles making short halts; segregation of pedestrians from motor traffic; high-intensity lighting; and car parks under viaducts. Pedestrians are discouraged from crossing the road at ground level by a central reservation with dwarf walls surmounted by reconstituted stone flower boxes. Instead of surface crossings, pedestrians will have brightly lit subways, lined with shop windows and approached by gently sloping ramps, at intervals of about 200 yards. The first of these is now finished. By the end of the year eight or nine will be ready. The completed length of road extends from the junction of Suffolk Street and Horse Fair to the Bull Ring area near New Street Station, a distance of about a quarter of a mile. This section includes the site of the projected Dudley Street bus station for out-of-town services. No part of the central business and shopping area will be more than 300 yd. from the ring road once it is completed.

One-Way Scheme at Liverpool

Another one-way traffic scheme in the centre of Liverpool came into operation on Sunday, February 28. Ranelagh Street has been closed to outward traffic, and Parker Street and Elliot Street to inward traffic. A large number of Liverpool Corporation Passenger Transport Department routes was affected, together with several Ribble, Crosville and other out-of-town routes.

Eastern Region Handles a Moscow Delivery

The first through consignment ever to travel to Russia by way of the Eastern Region Harwich—Zeebrugge train ferry—two tons of furniture and other household items—left London this week on the first stage of its 1,850-mile journey to Moscow for an embassy official. It followed a 1,700-mile rail journey across Europe, calling at Montzen, Aachen, Frankfurt (Oder), Rzepin, Malaszewicze, Brest Litovsk and Moscow. At the Polish frontier the consignment was to be transferred to a Russian wagon because of the break of gauge.

C.N.R. Tries Bulk Rail-Road Flour Delivery

Transhipment of bulk consignments of flour has been successfully tested in Halifax, N.S., by Canadian National Railway specialists. New rail flour carriers, built by the Canadian General Transit Company, are capable of carrying a 100,000-lb. load. At the rail siding the flour is siphoned from the covered hopper-type rail cars, which have a resin-coated interior, to a road tank truck. At the bakery warehouse the contents of the trucks are pumped under pressure into storage tanks. The aluminium road tank truck is capable of carrying 50,000 lb. of flour.

Russian Trading Organisations Listed

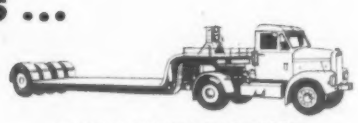
A new list of the State-organised export and import bodies of the Soviet Union contains the names of Autoexport for the export of road vehicles and off-the-road vehicles, Machinoimport for the import of transport equipment, Rasnoimport for the export and import of road vehicle tyres, Sudoimport for the import and export of ships, boats and marine equipment, and Sovfrakht for the transport, storage and insurance of all import, export and transit goods. All of these trading bodies except Sovfrakht are located at the following address: Moscow G-200, Smolenskaja-Sennaja 32-34. The address of Sovfrakht is Moscow K-12, Vladimirova 4.

Redevelopment of London

Fewer people, 20,000 each year, live in the County of London, but 15,000 more find work there each year, says the L.C.C. in a statutory review of its 1955-72 development plan. The number of people arriving by public transport in the morning peak went up by 27,000 between 1952 and 1958, but the number arriving in cars went up by 41,000, or 59 per cent, in the same six years. Total employment went up at double the national rate and new office accommodation is going up at a rate well above what is necessary simply to replace what the L.C.C. terms obsolete property. Four new areas of comprehensive housing redevelopment are nominated in Stepney, Bethnal Green, Lambeth (near South Bank) and Kensal New Town.

Out of the way places...

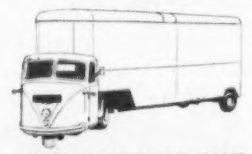
Overseas conditions are often very tough . . . and it takes a tough truck to cope with them. That's where Scammell's score every time. For most vehicles from Scammell's vast range—for "on" or "off the highway" operation—are hand-built jobs designed and constructed solely for the task in hand. Mechanical horses, automatic coupling semi-trailers, articulated six and eight wheelers, dump trucks, oilfield trucks and tractors are only some of the purpose-built Scammell vehicles for loads from 6,700 lb. to 336,000 lb. Solving transport problems is Scammell's speciality. Why not consult them on yours?



25-TON MACHINERY TRANSPORTER

ARTICULATED 8-WHEELER WITH HEAVY DUTY AUTOMATIC COUPLING

"MOUNTAINEER" 4 x 4 DUMP TRUCK



"SCARAB" MECHANICAL HORSE

... need out-of-the-ordinary trucks

A 6 × 6 "Super Constructor" with 250 b.h.p. 6-cylinder diesel engine, 8-speed semi-automatic gearbox and separate propeller shaft drive to each axle. Direct air operated gear changes at full torque—two-pedal control. The illustration shows the 67,000 lb. payload capacity oilfields truck, but other versions are available as motive units and as tractors for gross train weights up to 336,000 lb.

SCAMMELL LORRIES LTD.
Head Office & Works: Watford, Herts.
Tel.: Watford 25231 & 25691. Telegrams: "Twelfton Watford"

Built by SCAMMELL Specialists in the unusual

COMMERCIAL AVIATION

Weather Ships

UNITED AIR LINES IN 1959

A MEETING called by the International Civil Aviation Organisation to revise the agreement that now maintains nine floating weather stations in the North Atlantic Ocean begins in The Hague on March 17. These ocean stations are manned through the 1954 North Atlantic Ocean Stations Agreement co-ordinated by I.C.A.O. and participated in by 18 nations whose aircraft fly the North Atlantic. The major purpose of the stations is to fill the gap between the complex weather reporting networks in Europe and North America; the stations also provide meteorological, communications and radio navigational aids to aircraft, and serve as floating search and rescue bases. A total of 21 ships is needed to man the nine stations continuously. Each station consists of a 10-mile square patrolled by one ship; ships stay on station for a three-week period or until relieved, and it therefore takes between two and three ships to man one station continuously, depending upon how far that station is from their home bases. It is the responsibility of Canada and the United States to man the four most westerly stations; the other five stations are manned by France, the Netherlands, Norway and Sweden, and the United Kingdom. In addition, Australia, Belgium, Denmark, Germany, Iceland, Ireland, Israel, Italy, Spain, Switzerland and Venezuela regularly make cash contributions to defray certain of the costs of the service. The allocation of responsibilities, whether operation of ships or contribution of cash, between the countries concerned is based to a major extent (80 per cent) on the aeronautical benefits as represented by the number of flights made by the civil aircraft of each country across the North Atlantic, and to a lesser extent (20 per cent) upon the non-aeronautical benefits, such as the better forecasting of surface weather, which each country may receive. The chief purpose of the meeting in The Hague is to consider the possibility of reallocating costs and cash contributions so as to decrease the burden on those European states which operate ships.

P.A.A. Summer Schedules

Pan American Airways will schedule 40 weekly flights from London to the United States this summer, 34 of them by jet aircraft. There will be three jet flights daily to New York, one of them via Boston; a daily jet flight to Chicago and six jet flights weekly over the Polar route to the West Coast of the United States. In addition, P.A.A. is scheduling 21 jet flights weekly to Europe and six jet flights weekly to the Middle and Far East. The airline plans to introduce the Douglas DC8 jet on its transatlantic routes in April. Future jet schedules will be provided by both the DC8 and the Boeing 707 Intercontinental.

T.C.A.-B.O.A.C. Freight Capacity

More than 450 tons a week of air freight capacity to Canada will be offered this summer by Trans-Canada Air Lines and British Overseas Airways Corporation. The two airlines, which operate under a pooling agreement on transatlantic services, are co-ordinating air freight activities. Air freight destined across the Atlantic for all Canada from Europe will be moved by either airline, using the fastest, most convenient T.C.A. or B.O.A.C. flight available. Together, the two will provide more than 900,000 lb. of cargo capacity weekly.

Braniff Takes More Boeings

Braniff International Airways has announced that it has given the Boeing Airplane Company a letter of intent to purchase three Model 720 jet aircraft. The new medium-range jets would be in addition to the fleet of five 707 models previously ordered, of which four have been delivered to the airline. Delivery of the Model 720s would be in February, April and September of 1961. The new order is subject to negotiations of a mutually acceptable definite agreement, and includes an option for a fourth 720 for delivery in May, 1962. Braniff, now using its 707s on routes within the U.S., will begin jet service to South America in April. The Braniff 720s will be powered by Pratt and Whitney JT3-C7 jet engines.

Swissair Jet Services

Swissair will introduce Rolls-Royce powered Caravelle jet liners on May 21 on its twice-daily Super Swiss service between London and Zurich. On May 24 Swissair will also start nightly tourist flights by Caravelle between London and Zurich, subject to government approval. Mid-July will see the introduction of Swissair Caravelles to Athens, Istanbul, Ankara, Cairo and Tel Aviv. There will be daily Caravelle services to the Middle East, all via Athens. Flying time from London to Athens will be reduced to 4½ hr. from the present 6½ hr. Also from mid-July Caravelles will fly between Switzerland and Scandinavia and from mid-August to Madrid, Lisbon and Vienna. The aircraft will have 20 first- and 50 tourist-class seats. Douglas DC8s are scheduled to start services to New York on May 30 and will gradually take over from DC7Cs. Initially the routing will be Zurich—Geneva—New York, with flying time from Geneva 8¼ hr. From July some of the North Atlantic jet services will also call at Cologne and Lisbon. Twelve flights weekly, all by DC8s, are scheduled from early September, when Shannon will also be served by jets westbound. Swissair DC8s will have 28 first- and 92 economy-class seats.

U.A.L. Results for 1959

Net earnings of $10,236,000 in 1959 and a $3,563,000 gain on aircraft sales have been reported for United Air Lines by Mr. W. A. Patterson, its president. Earnings for the first nine months were well ahead of 1958, but the last quarter was under the previous year's levels. This was attributed to jet competition and reductions in United's scheduled capacity because flight crews had to be withdrawn from operations for necessary DC8 training. Mr. Patterson also pointed out that 1958 final quarter earnings were inflated due to strikes against competitors. Although operating revenues were affected by the same factors, they reached a record $330,156,000, a rise of 3 per cent over 1958. Revenue per ton-mile of payload rose from 51.7 cents in 1958 to 53 cents. The increases reflected a full year's benefit from the industry-wide reduction or elimination of fare discounts in October, 1958, Mr. Patterson explained. The company carried 7,521,000 passengers and 137,000 tons of mail, express and freight as compared with 7,276,000 passengers and 122,000 tons of cargo in 1958. In the first seven months of 1959 traffic exceeded previous records. Revenue ton-miles for the year totalled 617,446,000, an increase of ½ per cent.

SOUTH AFRICAN RAILWAYS CENTENARY

Mr. D. H. C. du PLESSIS, M.Inst.T.

• • • • • •

General manager since December, 1952, of the South African Railways, which this year celebrates the centenary of railways in South Africa, Mr. D. H. C. du Plessis is the seventh occupant of that office since the undertaking assumed its present form in 1910 with the amalgamation of the Cape Government Railways, Central South African Railways and Natal Government Railways. As a railwayman by training, preference and devotion, it is particularly appropriate that he should occupy the post in the celebratory year. Born in Johannesburg on March 21, 1898, he entered the railway service as a clerk in June, 1915, serving successively in the then assistant general manager's and general manager's staff offices until 1931, when he was appointed supervisor, transport competition, at Johannesburg. In that post he established liaison machinery between the South African Railways and the Central Road Transportation Board. Three years later he became secretary to the Railways Board, serving the Minister of Railways and Harbours and the Board in that capacity until his return to Johannesburg in 1937 as superintendent (parliamentary). In 1939 he was appointed system manager, Bloemfontein, promotion to the corresponding post at Johannesburg coming four years later. After two years in that office, he was made chief harbour, shipping and development manager. And then, in February, 1949, he took up the position of chief staff manager. A year later he was made deputy general manager and then, as mentioned earlier, succeeded Mr. W. H. L. Heckroodt as general manager late in 1952. In the course of his work Mr. du Plessis served in the secretariat of the Government Commission which, in 1929-30, investigated road-rail competition and largely instigated the 1930 Act under which South African transport is controlled today, whilst in 1934 he was secretary to the international commission under Sir Guy Granet, which investigated the working of the S.A.R. After the completion of the report, he studied railway working in Britain and Germany and he led the mission from South Africa which visited Europe and North and South America in 1946. In the following year he and Mr. A. J. Gibson constituted the Royal Commission which inquired into railway operation in Western Australia. He has served also on numerous investigating committees in South Africa. A convinced believer in the future of railways as such—he is also, of course, concerned with airways, road transport, shipping, ports and grain elevators—he is equally determined on the importance of transport education and has contributed notably to the work of the Institute of Transport in South Africa.

BULK PROPANE

Supplies to Industry

INCREASED DISTRIBUTION

DISTRIBUTION of bulk liquid propane, supported by free technical service and maintenance, is among the latest facilities offered by British Oxygen Gases, Limited, to large industrial customers throughout the United Kingdom. Bulk holding tanks, enabling liquid propane to be stored without loss, can now be installed on a free loan basis at customers' works. Already, the new system is in use in steelworks, shipbuilding, scrap, demolition and shipbreaking yards and engineering works. During more than 16 years B.O.G. has built up a complete propane distribution service covering the whole of the United Kingdom. During that time the demand for propane has increased considerably and its suitability as a fuel gas in steel cutting has become well established.

Industrial customers using large quantities of propane from cylinders are faced with handling and storage problems; to overcome these difficulties, B.O.G. can offer either cylinder manifolds and pipelines with individual outlet points, or for the large consumers, bulk storage tanks and pipelines. Bulk propane holding tanks are offered to customers on a free loan basis. Large industrial users can change quickly from cylinder supply to the bulk system and enjoy more advantageous prices, with little or no capital outlay for the new installation. The bulk propane installations are maintained free of charge; regular visits are made to customers in all districts and repairs where necessary are immediate and without charge.

AT THE SWISS SHOW

(*Continued from page 5*)

of which were hinged side rails, which formed steps when lowered, and spring-loaded side sheets like roller blinds housed in the body canopy. The Frey forward-control cab of moulded plastics is extremely attractive and seats three—compared with two in the standard B.M.C. forward-control cab—but it adds S.Fr. 4,000 to 4,500 (£330-375) to the cost in Switzerland of the Austin diesel-engined 702 chassis and standard cab of about 27,700 francs (£2,300). Prominent on the Frey stand were petrol- and diesel-engined versions of the Austin Mark II Gipsy and examples of the recently introduced Series IV medium-capacity vehicles featuring the unique FG cab with doors angled across the rear quarters. Series IV chassis and FG cabs also attracted interest on the stand of J. H. Keller A.G., where they were shown with other B.M.C. products carrying the Morris brand, including variously bodied examples from the J2 15-cwt. range, and two Nuffield Universal tractors.

New Commers

The new 15-cwt. forward-control Commer was shown in three of its many manifestations, including a very compact mobile shop and a side-loading van, on the stand of Rootes Autos S.A. in company with the new Commer Cob, which we described in our last issue. Also on the stand was a Karrier Gamecock chassis powered by the Rootes underfloor two-stroke diesel engine mounting a Brunner bottle-carrying body—a type that has become popular in Switzerland for its full three-seat forward-control cab, very economical operation and low loading line. Among the Rootes vehicles available for demonstration was a Commer ½-ton eight-seat station wagon in attractive red-and-white livery—identical to the vehicle which most satisfactorily formed our own transport to Geneva this year. A sectioned working model of the Rootes two-stroke engine in multi-fuel form created great interest on the stand.

General Motors Swisse S.A. had a selection of Bedford vehicles on its stand from the popular CA van up to the latest RLHC forward-control four-by-four chassis and cab. Also on the stand was a Chevrolet Viking—a normal-control 5-tonner of which the cab occupied practically half of the wheelbase and was (one hopes) the last word in sheer extravagance of sheet metal and frontal embellishment, but technically interesting for its use of torsion-bar independent front suspension. This form of suspension might possibly give some riding advantages but nevertheless, as shown, obviously required large clearances between front tyres and wings, making access to the normal cab almost as stiff a climb as into an average British forward-control cab.

Thames Traders

Also notable for excess sheet metal and unfunctional and unnecessary angles and bulges (beef it up!) was the tilt cab on the V8 petrol-engined American Ford C550 chassis shown by Ford Motor Company (Switzerland) S.A. This vehicle appeared on the stand with various examples of Dagenham Ford Thames vehicles, from the 5-cwt. van up to 6D-engined Traders, and several manifestations of the German Taunus van. One of the Thames Traders was equipped with a very attractive full-fronted plastics cab built in Switzerland by Fluckiger; its much easier access and undoubtedly better appearance than the standard Trader cab unfortunately cost the Swiss buyer about 8,000 francs (£660)—at least four times the price of the Dagenham product.

One Kew Dodge—a forward-control 5-tonner—was shown by Motorwagenfabrik A.G., in company with a 5-ton dropside lorry and a fire engine on chassis of the exhibiting concern's own Mowag make, which incorporate U.S. Chrysler petrol engines and other units. When diesel engines are specified, Mowag chassis are fitted with Perkins P6 or R6 units. Also on the stand was a four-wheel-drive U.S. Dodge Power Wagon with 7-seat body.

Other British commercials on show included two versions of the Standard Atlas—a pick-up and a side-loading van—and petrol- and diesel-engined versions of the Land-Rover, which is popular in Switzerland as elsewhere and was shown by E. Fehlmann and Company. Various other products of the British motor and allied industries were represented by a Leyland diesel-engined Bray shovel, a Rootes diesel-engined Wetherill shovel, a Rolls-Royce diesel-engined Vickers Vigor tracked tractor and a wide variety of components, accessories and servicing equipment on numerous stands. Traditionally, the adjoining stands of Lucas, C.V.A. and Girling showed the latest in vehicle electrical, fuel-injection and braking equipment, while products of Pressed Steel, Dunlop, Smiths and K.L.G., Wilmot Breeden, Trico-Folberth, Crypto... and others were well presented.

(*To be continued*)

OVERSEAS Built for heavy earth moving, the massive A.E.C. 18 cu. yd. 375 b.h.p. "Dumptruk", with torque converter and rear axle springs, tips 25 tons in 10 seconds.

A.E.C.

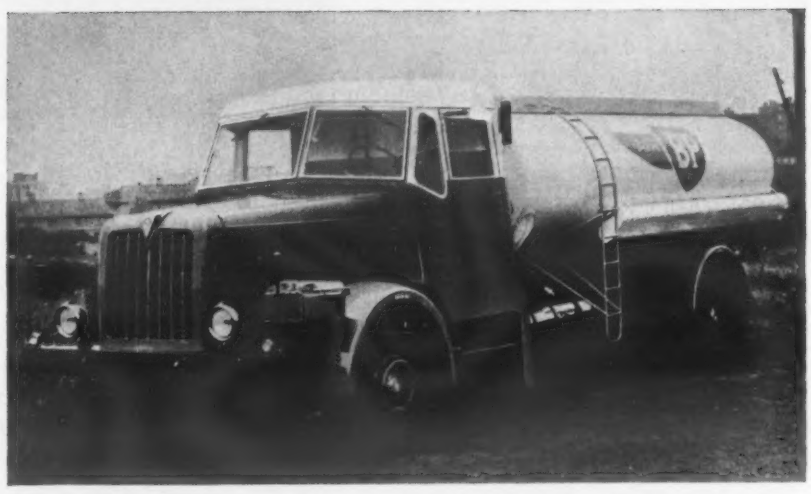
meets today's challenging transport needs

PORTUGAL Built for intensive city traffic, the "Regent" Mark V is conspicuous among the many A.E.C. double-deckers serving the city of Lisbon.

Built by a Company with nearly 50 years' experience of designing road vehicles, A.E.C. buses, coaches and trucks are unrivalled for toughness, hard work, operating economy and reliability under the most exacting and gruelling conditions.

Proved in service all over the world they are today operating as heavily laden trucks on dirt roads, as packed-to-capacity long-distance coaches, as full-to-the-limit stop-and-go city buses. Everywhere, backed by world-wide spares and service, they ensure better road transport.

With branches, distributors or Associated Companies in over 45 countries, A.E.C. provide a service which is second to none.



TURKEY The tough 150 b.h.p. "Mammoth" Mark III in service as a 2,500 gallon petrol tanker — one of 10 operated by B.P. (Aegean) Trading Ltd.

INDIA The robust, underfloor engined A.E.C. "Regal" Mark V — one of 40 working for the West Bengal State Transport—is particularly suited for overseas operation.

SOUTH AFRICA Highly popular for medium weight loads, the 103 b.h.p. 31,360 lbs. gross A.E.C. "Monarch" Mark VI is adaptable for many purposes.

WEST INDIES The ever popular A.E.C. single-deck "Reliance" bus used by the Trinidad Bus Board. The "Reliance", with its 125 b.h.p. diesel engine, is going into service overseas in ever-increasing numbers.

NEW ZEALAND Three of a fleet of A.E.C. "Mammoth Major" cement tankers operated by the New Zealand Cement Co. Ltd.

A.E.C. LIMITED · SOUTHALL · MIDDLESEX

PASSENGER TRANSPORT IN SYDNEY

Acceleration of Tramway Abandonment

DECLINE IN CITY TRAVEL CONTINUES

WHAT may be regarded as the final phase of the tram to bus conversion programme in Sydney, New South Wales, commenced in June, 1959, with the closure of Waverley depot for reconstruction as a major bus depot. On completion of Waverley, the only constructional work remaining is the rebuilding of Rushcutters Bay depot as a satellite bus depot enabling the final stage of the tram to bus conversion to be completed. If the programme as now revised is achieved, the last trams will cease operating in February or March, 1961. Earlier, the target date was some time in 1962.

The annual report of the Commisioner for Government Transport in New South Wales, Mr. S. B. Berry, says that the department's financial position deteriorated during the year ended June 30, 1959, mainly as a result of reduced passenger revenue. The combined loss for all services amounted to £1,871,032, an increase of £423,954 compared with the loss in 1957-58. Basic wage and award variations increased expenditure by £186,000 and in addition depreciation and interest rose by £131,655. All these increases were more than offset by economies introduced and total expenditure was £136,346 less than in 1957-58. Since 1956 the minimum fare has been 6d., rising to a maximum 1s. 9d. on trams; there is no maximum on the buses. The New South Wales Governmen Transport Department is responsible for street passenger transport in Sydney and Newcastle. A summary of the operating results in both cities appears in the accompanying table.

N.S.W. GOVERNMENT TRANSPORT

	1957-58 £	*1958-59* £	*Increase(+) or Decrease(−)* £
Income:			
Revenue from passengers, rents, advertising, etc. ..	12,915,270	12,290,440	−624,830
Subsidy paid by Treasury in respect of travelling concessions to children, pensioners and students ..	905,470	970,000	+ 64,530
	13,820,740	13,260,440	−560,300
Expenditure:			
Working expenses	13,871,511	13,603,510	−268,001
Depreciation	642,649	691,772	+ 49,123
Capital debt charges ..	753,658	836,190	+ 82,532
	15,267,818	15,131,472	−136,346
Net Loss	£1,447,078	£1,871,032	+£423,954

More One-Man Single-Deckers

During the year 106 new underfloor-engined single-deck buses were delivered to the department and these vehicles enabled further expansion of one-man bus operation, both on existing bus services and on converted tramway services. New buses are now being delivered at a rate of 11 per month and it is planned that this rate will be accelerated early in 1960 to approximately 19 buses per month. Most of the additional vehicles will be used in substitution for trams, but some will replace a number of prewar double-deck buses now reaching the end of their useful life. The new vehicles will permit of a further expansion of one-man operation.

Passengers carried in Sydney and Newcastle during 1958-59 totalled 292,857,000, a decrease of 17,230,000 or 5.6 per cent compared with 1957-58. This rate of decline was heavier than in the previous year, but the position had improved slightly towards the end of the financial year when the rate of decrease had dropped to slightly less than 5 per cent. The expansion of shopping facilities and other business activities in suburban areas, the increased use of private motor vehicles and the growth of television continues to seriously affect the numbers of passengers using the services.

Position of Tramways

The heaviest loss of passengers occurred on Saturdays and Sundays when the use of motor vehicles for pleasure purposes is greatest and it is expected that there will be little variation in the present trend if the number of motor vehicles continues to rise. The continuing loss of passengers coupled with increased wage rates makes it essential that the remaining tramway services be converted to bus operation as speedily as practicable, and thus obtain as early as possible the financial and other benefits which will flow from the lower operating costs of buses and the removal of costly overhead expenses.

A conversion programme covering all tram services yet to be abandoned has been planned. All major requirements as far as depot accommodation and vehicle availability have been determined and for the most part are already covered by contract. The final conversion (February or March, 1961) has been brought forward to the earliest date considered practicable. Each stage of the conversion programme reduces staff requirements, provides opportunity for more efficient co-ordination of services and further scope for one-man bus operation. However, the full effect of the benefits to be obtained from bus operation will not be achieved until all trams are displaced and the overhead costs connected with electric traction eliminated.

Streamlining of Schedules Ahead

Because of the declining patronage service reductions cannot reasonably be avoided and continuous examinations are made of loading figures so that timetable frequencies can be adjusted to meet requirements. Substantial savings in labour and other operating costs have been achieved by these adjustments, but so much detailed work is involved in investigating and planning a major timetable change, that the implementation of needed adjustments is often delayed, with adverse effect on financial results. When all conversions have been completed the department will be able to give greater attention to service adjustments and will have a better opportunity of providing stable, efficient services at an economic level.

Although tramway maintenance costs are below normal the cost of operation per passenger-mile has risen sharply and to a much greater extent than the bus figure. The cost per passenger-mile in 1958-59 for tramway operation was 0.95d. higher than the cost for Sydney buses. It is evident, therefore, that substantial savings should be obtained as the conversion programme proceeds; on the basis of the lower cost per passenger-mile, the ultimate reduction in operating costs will exceed £500,000 per annum.

In the seven years since June 30, 1952, the department has effected economies in relation to wages and salary payments at an estimated rate of £3,213,400. However, these savings have been more than offset by significant increases in wages and salary rates and in improvements in conditions —totalling in all £3,461,683—which have been granted over the same period. Since 1946 the average basic weekly wage has soared from £4 18s. 7d. to £13 14s. 9d. Since 1953 the annual wages and salaries bill has actually decreased by 0.3 per cent, but the cost of wages and salaries per passenger-mile has increased by about 40 per cent.

The increasing trend in motor vehicle registrations has continued and at June 30, 1959, the number of motor cars registered had risen to 588,175, an increase of 35,256 compared with a year earlier. In recent years, says the report, the expansion of shopping facilities and the growth of industry in the outer suburban areas of Sydney had been particularly heavy and out of proportion to the overall increase in population that has occurred in the Sydney metropolitan area. It is evident that there has been a movement of business and industry adversely affecting the central city area and the inner suburban areas.

Exodus from Central Area

In this regard, statistics released by the Cumberland County Council show that in the period from 1949 to 1956 retail sales in the suburban areas increased from 48 per cent to 64 per cent of the total sales in the whole of the Sydney metropolitan area; over the same period retail sales in the city proper declined from 52 per cent to 36 per cent. In the same report it was observed that the inner areas of Sydney had lost population to the outer suburban areas and that industrial growth had moved in harmony with the population trends.

The movement generally follows a pattern of decentralisation of employment and population planned under the county of Cumberland planning scheme which was approved by the legislature in 1951. One of the stated objectives of the scheme was a desire to improve the relationship between homes and places of work, thus removing or reducing the times and distances involved in travelling to and from work.

The Television Age Arrives

In the 12 months under review the number of television licences in New South Wales increased from 143,422 to 300,871 and is continuing to increase at a rate of nearly 12,000 per month. On the basis of these figures it could well be that there are up to one million television viewers in Sydney each night (the population of the city is some 2,100,000). It is known that other forms of entertainment at night time have been seriously affected by television and in turn the demand for public transport has declined heavily. The falling-off has been such that major reductions of service at night on some routes have been made and further reductions will probably be necessary.

The aggregate of the losses sustained on Saturdays and Sundays totalled £1,040,000 and represented 56 per cent of the overall loss for the year. Cost of operation at weekends is much greater than on weekdays due to the high penalty rates paid, revenue is lower and in many cases the provision of services to sporting fixtures and beaches is most unprofitable, even when heavily loaded, due to costly standing time between forward and return peak periods. Even with excellent weather conditions there are only a few services capable of earning sufficient revenue to offset the high operating costs, and wet or cold conditions frequently reduce total collections to less than half the normal average.

Ten Tram Services Replaced

During the year under review 10 tram services in all were completely replaced by an increased number of bus routes and numerous modifications were introduced. Generally speaking, conductors are dispensed with on these replacement services on Monday-Friday evenings and also on Sundays, either in winter or all year round.

Mr. A. A. Shoebridge retired from the office of Commissioner on January 13, 1959, having reached compulsory retirement age. He had served the state 48 years, 8½ of them in that capacity. His successor, Mr. W. L. Carter, was forced to resign the appointment on September 11 last year due to ill health, since when, as already indicated, the Commissioner has been Mr. S. B. Berry. Mr. Carter had also had 48 years' service.

★

AUTOMATIC DOOR-OPENER

Electro-Hydraulics Equipment

HITHERTO something of a luxury, automatic door-opening equipment, the cost of which could be reduced to an economic level with a reasonable level of production, has been developed by Electro-Hydraulics, Limited, Liverpool Road, Warrington. The company has supplied a number of successful systems to various users and has developed the new equipment in order to appeal to a wider field. It would be of special value in planning mechanical handling systems and in saving drivers' time and perhaps damage to doors and vehicles on internal works transport.

The new Electro-Hydraulics equipment comprises a light beam on one or both sides of the door directed on to photoelectric relays, an electric control box, a pressure-controlled electric motor coupled to a pump, a hydraulic accumulator and two-way hydraulic door-operating jacks. The system is fully protected against overloading.

The light beam is sited at a suitable distance from the door—usually about 10 to 15 ft.—and when the beam is broken by an approaching person or vehicle an electrically operated valve sets the opening gear in motion. After a suitable delay, which is adjustable to meet individual requirements, the jack motion automatically reverses and the doors close. If the beam is broken while the door is still open closure is delayed for a further preset period. Fitting of the equipment does not interfere with the normal opening of the door by hand.

IN...

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RAILWAY DEVELOPMENTS IN PORTUGAL

Electrification an Outstanding Feature

PROGRESSIVE DIESELISATION PLANNED

CONSIDERABLE sums have been allocated to railway modernisation and re-equipment under the terms of Portugal's Second Development Plan (1959-64), and work in many sectors is proceeding apace. Electrification is to play an important part in the general scheme, with the conversion of the main Northern Line between Entroncamento and Oporto, as well as short sections radiating from the latter city, and involving a total of 241 route-kilometres (150 route-miles).

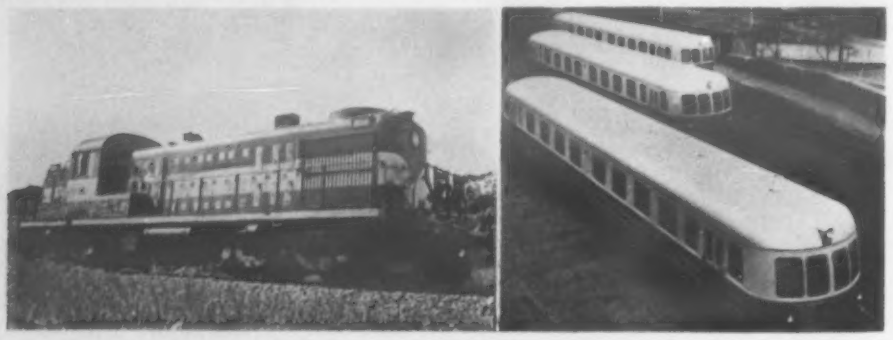
It was in April, 1957, that the new electrified service between Lisbon (Rossio) and Sintra was inaugurated, followed two months later by the first stage of the Northern Line electrification, as far as Vila Franca de Xira. On June 30, 1958, electric trains started to run between Santa Apolonia terminus and Entroncamento (66 miles), and already the overhead equipment has been extended to beyond Pombal, which is roughly half-way to Oporto.

The results achieved on the Sintra line alone provide a foretaste of the success that is likely to accompany the introduction of improved services elsewhere. For example, comparing the first 12 months of electric with the last 12 months of steam operation, sales of tickets, including seasons, increased by 46.2 per cent and total receipts by 38.7 per cent.

Other Features

In the realms of diesel traction, there is to be a progressive introduction of locomotives ranging from 800 to 1,600 h.p. to serve the broad-gauge lines in the Douro and Minho provinces; these will be supplemented by multiple-unit sets as well as single railcars, destined both for the former and for the narrow-gauge lines of the Vale do Vouga and the Vale do Corgo. Carriage and wagon stock is to be completely overhauled; the first step provides for the acquisition of 20 new passenger vehicles for main-line services, together with 350 broad- and 60 narrow-gauge freight vehicles of varying types.

To increase line capacity and provide better facilities for through running, a number of improvements is envisaged. On the Northern Line, for example, this includes the doubling of the 12.2 miles of single track between Fátima and Albergaria and of the line traversing Eiffel's bridge over the Douro between Vila Nova de Gaia and Campanhã; the latter scheme confronts the authorities with an acute problem, but it is understood that the framework of the new Arráoida road-bridge in Oporto, now under construction, can be easily and inexpensively adapted to provide the second arch for the railway structure. Elsewhere, it is proposed to construct a by-pass route for through traffic near Beja and a spur linking the Northern with the Western main lines (the latter leaves the Sintra line at Cacém and serves centres such as Caldas da Rainha and Figueira da Foz); this link will pass close to the shrine of Our Lady of Fátima—a focus of many national and international pilgrimages.

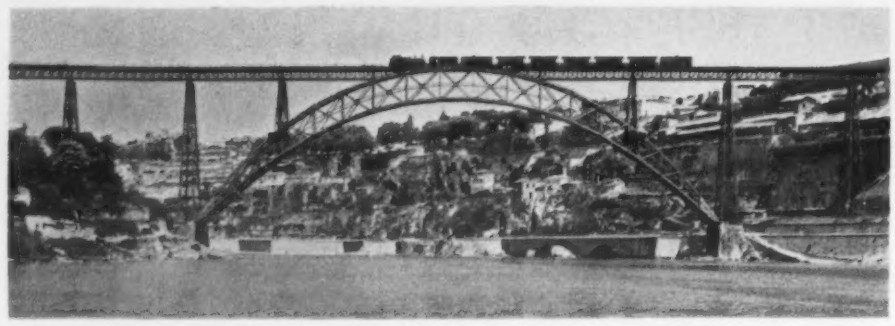


An A1A-A1A diesel-electric locomotive rated at 1,820 h.p. built by the American Locomotive Company for Portugal; maximum speed is 75 m.p.h.; right, these 96-passenger Nohab railcars for secondary services are equipped with two Scamia-Vabis 150-b.h.p. diesel engines and provide for 16 first-class and 56 second-class seats.

Track Renewal

Permanent-way and other civil engineering work of importance involves the relaying of about 190 miles of broad-gauge and 65 miles of narrow-gauge track, not to mention the strengthening of 76 bridges—58 of which are situated in the "Beira Baixa" and 18 in the Douro area. The extension and modification of layouts at a number of stations and yards, having in view the heavier and longer train formations that can be handled by the latest tractive units, is another essential task. No less so is the comprehensive modernisation of locomotive and carriage depots and concomitant work-shops, to cater for the new electric and diesel stock and to provide facilities for economic maintenance, repairs and re-fuelling.

Finally, as a logical consequence of the greater volume of traffic and higher speeds contemplated, a complete overhaul of the signalling and telecommunication methods has been accorded a special priority on all lines where there is intense movement. In this connection, by the end of 1958 modern block equipment, including colour-light signalling, had been installed on the Sintra line and over a considerable stretch of the Northern Line.

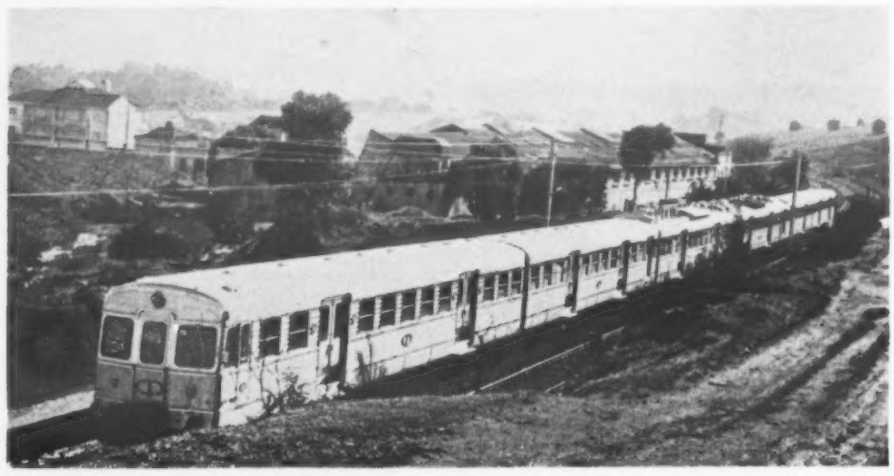


The Maria Pia bridge at Oporto. This is the only rail connection across the Douro between the northern and southern sections of the Portuguese railway system

Confidence in the Future

Faced with these extensive new works, the authorities of the Companhia dos Caminhos de Ferro Portugueses can at least take courage from the fact that economies resulting from the early stages of modernisation have already been on a not inconsiderable scale. They are also confident that heavy capital outlays on the renewal and maintenance of existing track and installations and on the building of new lines (outlays which would be far heavier were such tasks to be deferred) will, within a reasonable period, be defrayed by the additional economies accruing from the later stages.

The Companhia dos Caminhos de Ferro Portugueses has placed a contract with the Swedish firm of L. M. Ericsson Signalaktiebolag for the installation of C.T.C. on the line between Setil and Vendas Novas. The total cost of this installation, the first of its kind in Portugal, is estimated at 18,000 contos (£225,000 approximately), and it will operate on 70 km. (43.5 miles) of single track serving 9 intermediate stations. The particular stretch selected is an important one, since, after leaving the Northern line at Setil, it links up at Vendas Novas with one of the main routes of the Alentejo which starts from Lisbon's Barreiro terminus and serves key points such as Casa Branca (junction for Evora, Estremoz and Vila Viçosa) and Beja (with connections to the Algarve and the Spanish frontier at Vila Real Sto. Antonio).



Typical multiple-unit electric train for the Portuguese railways

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The Cardiff depot of the Michelin Tyre Co., Limited, has moved to Garth Street, Adamsdown (tel. Cardiff 33948). The depot serves part of Glamorgan and the whole of Breconshire and Monmouthshire.

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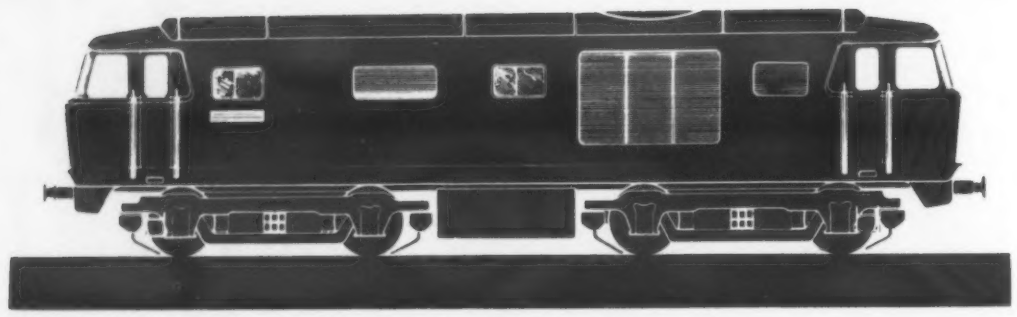

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BIG BUSES IN JOHANNESBURG

Guys to Take 105 Passengers

END OF TRAMWAYS IN SIGHT

DURING 1960 the Johannesburg tramways, which suffered another curtailment at the end of January, will disappear altogether. As our illustration shows, the undertaking has for many years employed cars of 78-seat capacity on its tramways and with standing room these carried at least 108 passengers in the peak hours. Now that city transport is being entrusted entirely to buses and trolleybuses it has been felt necessary by Mr. Frank Gait, the general manager of Johannesburg Municipal Transport, to provide units of practically equal capacity and so a number of diesel buses and trolleybuses on six-wheeled chassis 34 ft. long and 8 ft. 6 in. wide has been provided. The buses, on Guy chassis, have bodies by Bus Bodies (South Africa), Limited, with 85 seats and room for 20 standees—probably the world's largest.

One of the 105-passenger Guy buses with 156 b.h.p. Rolls-Royce diesel engines in service in Johannesburg

The chassis for such a vehicle has to be of outstanding characteristics and we therefore summarise the specifications to which Guy Motors, Limited, of Wolverhampton, worked. The Rolls-Royce six-cylinder diesel engine chosen is the direct-injection C6NFR type, with 5¼-in. bore and 6-in. stroke, giving a capacity of 12.17 litres and an R.A.C. rating of 63 h.p. The compression ratio is 16 to 1 and when derated for operation at an altitude of 6,000 ft. in Johannesburg the maximum power output is 156 b.h.p. at 2,100 r.p.m. The maximum torque yielded is 425 lb.-ft. at 1,300 r.p.m. Cooling is by an eight-bladed 24-in. fan and fuel injection by a C.A.V. N-type pump. The engine has a fully flexible four-point mounting on rubber.

Transmission

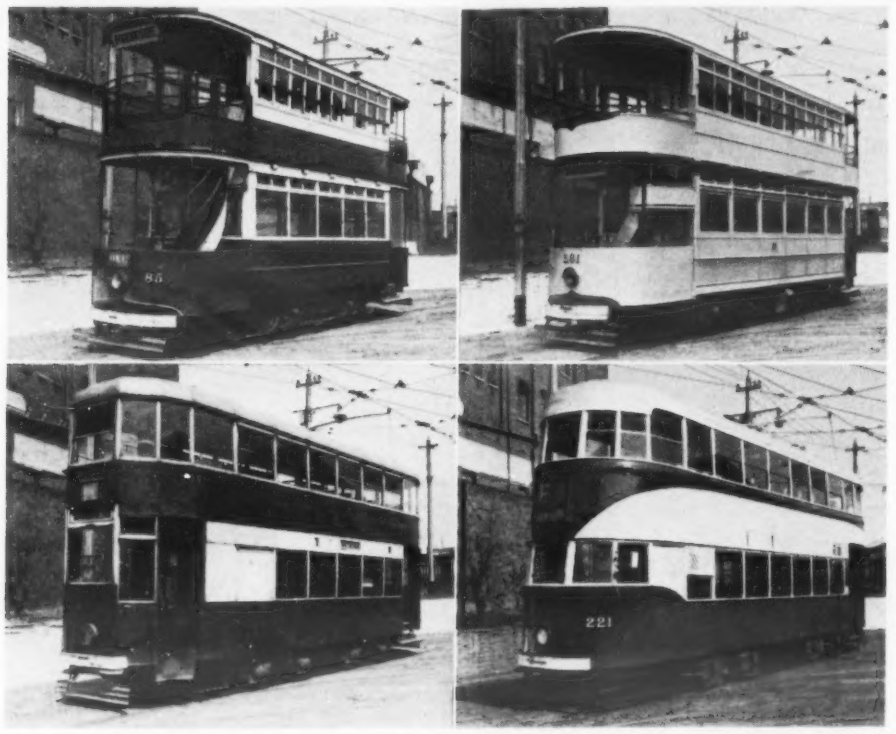
Power is transmitted by a fluid coupling and a five-speed preselective epicyclic gearbox. The ratios are first 5.55 to 1; second 4.2 to 1; third 2.38 to 1; fourth 1.57 to 1; and fifth direct. The reverse ratio is 9.087 to 1. Gear engagement is air actuated. The propeller universal shafts are of the open tubular type with needle bearing universal joints. Joints are shielded against oil-throwing and a safety bridle is provided at the front end of the rear shaft. Final drive to the rear bogie is to both axles, with a reduction ratio of 6.75 to 1. The double axle rear bogie is of the balancing beam type; each axle has an underslung wormdrive and there is a third differential to divide the driving torque equally between the axles.

For a long wheelbase heavy chassis this type of axle is preferred to the pivoted spring type, since load reactions from the rear springs are spread over six points on the main frame instead of two, with resultant lower frame stresses. Moreover, suspension is good as the frame rises only half the height of any given bump in the road. Axle shafts are fully floating and are machined from nickel-chrome-molybdenum steel forgings; the casings are one-piece steel drop forgings with spring seats and brake anchor brackets pressed on the axle arms. The worm drives are of 8½ in. centres. Rubber bumper blocks reduce excessive motion of axles and of the balancing beam.

Brakes

Heavy-duty cam-operated brakes are fitted; a 15 cu. ft. min. two-cylinder compressor is driven in tandem with the fuel pump. Each brake unit has its own direct-acting diaphragm type chamber to ensure equal application. The operating valve is controlled by the brake pedal; foot pressure is proportional to braking effort. Two air reservoirs are mounted on the inside of the frames, the primary reservoir, from which air is drawn, being piped direct to the compressor. A diverter valve is fitted between primary and secondary tanks, allowing the former to be quickly charged to a pressure at which good braking is available. This predetermined pressure actuates the diverter valve and puts the secondary tank into communication with the primary tank and both are then charged together. The secondary reservoir supplies the gearbox power cylinder and when fitted, the steering servo cylinder, at the same time providing an additional reserve of compressed air and permitting a greater number of brake applications should compressor failure occur. In addition, an auxiliary reservoir, for door-operating requirements, can be supplied if required. Low-pressure warning devices are provided, in the form of an electrically operated buzzer and combined signal arm.

Brakes are of Kirkstall simple two-shoe construction, having no self-energising properties. Contributing to efficiency are the special shaped cams and shoe toe-pads, which transmit braking effort to the shoes without friction. Each malleable cast-iron shoe has its own pivot pin, with renewable bushes, full stability for the extra-wide brake linings being obtained by double pivot pin bosses straddled over the pivot pin supports. By this means, the shoes apply a constant pressure over their whole width and the wear of the linings is evenly distributed. Massive chrome-iron alloy brake drums with precision ground wearing surfaces eliminate scoring and reduce drum wear.



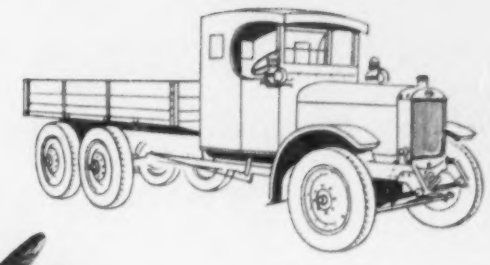
Four-wheeled tramcar for Johannesburg, built in 1905, with 62 seats and 18 standing capacity; 1913 equal-wheel bogie car—82 seats and 20 standing; below, E.M.B. truck experimental car of 1935—78 passengers and 20 standing—and, right, the 1936 type with regenerative control and M.C.W. 78-seat body

Nearside view of Guy six-wheeled bus with coachwork, 34 ft. long by 8 ft. 6 in. wide, by Bus Bodies (South Africa) Limited, to seat 85 passengers and accommodate 20 standing —a total of 105

The front brake linings are 16½-in. dia. by 7 in. wide and provide an area of 348 sq. in. The rear brake linings are 17-in. dia. by 6 in. wide, providing an area of 640 sq. in. Moulded linings, ½ in. thick, are employed throughout. Simple and accessible manual adjusters are provided at each wheel. Brake drums are detachable without disturbing the hubs.

The handbrake is of the multi-pull type and, as

(*Continued on page* 31)



A typical example of a six-wheel lorry manufactured by Guy Motors Limited, during the years 1928|29.

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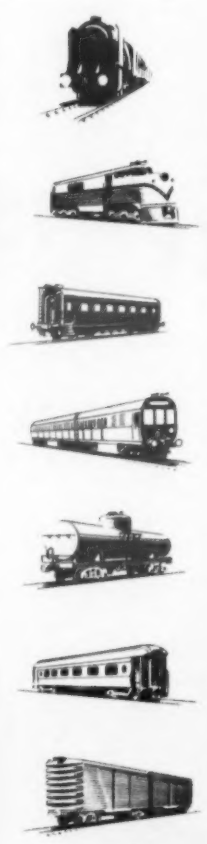

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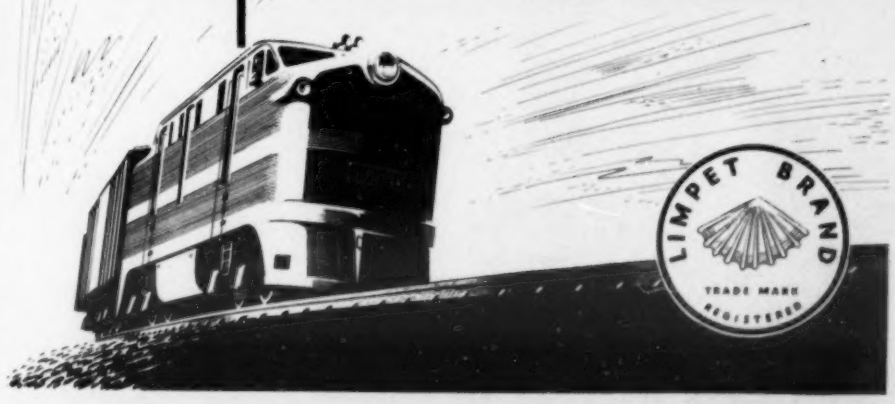

SL2

AMERICAN VEHICLE REQUIREMENTS

Possibilities for British Manufacturers

NEW LOOK BUS SOUGHT BY NEW YORK TRANSIT AUTHORITY

WITH British cars and some of the lighter types of commercial vehicle selling in large and increasing numbers in North America and a quite dramatic current demand from that quarter for British diesel-engined agricultural tractors, British manufacturers of heavy vehicles might well be asking themselves what are the market possibilities for their particular products in the United States and Canada. That this has been more than a passing thought as far as some manufacturers are concerned is evident from the recent formation in New York of Leyland Motors (U.S.A.) Inc. under the auspices of the successful Jaguar Cars American sales organisation.

British commercial vehicles are competing successfully with American products in many world markets and, with proper organisation, there appears no good reason why they should not be able to do so effectively in the American domestic market, provided some policy aspect, such as has recently affected the sale of British electrical equipment in America, does not prevent it. Among the strong selling points of British heavy vehicles in any market is the undoubtedly supreme efficiency of the British automotive diesel engine; already quite substantial numbers of these of both A.E.C. and Leyland manufacture have found their way into American and Canadian vehicles, principally buses and coaches, during the past few years and have won a reputation for reliability and durability as well as for fuel economy.

It is pertinent here to remark that information given to us by New York City Transit Authority during a recent visit indicated that the average diesel-engined 45-seat bus achieves only about 3 m.p.g. on Manhattan routes and up to about 5½ m.p.g. on suburban services on Staten Island.

Proper organisation has been mentioned as one of the requirements for breaking into the North American market and one aspect of this, however self evident it might appear, needs the utmost stress. This is service and spares support on a scale to match that of domestic producers, and no sales campaign, however brilliant and successful initially, can hope for sustained success without it. Another possible bar is alien screw threads, and while this has not apparently been an adverse factor in American car and tractor imports from Europe, it might well be in heavy commercial vehicles, which have a much longer life expectation necessitating at least one major overhaul, when the need to import replacement nuts and bolts would be an embarrassment. One engine manufacturer gets round the problem by shipping sets of engine components to North America, where they are tapped for and fitted with American studs, bolts and nuts and assembled. A possibly more effective overall solution would be the complete adoption of Unified screw threads, which are now becoming acceptable universally.

Power Comparisons

One direction in which British heavy goods and express passenger vehicles would be at a disadvantage in the American market is their comparatively low power, although the difference in usable power between American and British automotive diesels is significantly less than a study of manufacturers' brochures would suggest. This is due in part to the different standards adopted for measuring engine performance (which the various authorities are now attempting to rationalise) and in part to the more efficient fuel-injection equipment and combustion control of the British product, which generally produces flatter torque curves over a wider speed range and thus greater effective power for automotive purposes. The Leyland and A.E.C. diesel engines already in use as well as the diesel-engined British tractors have created something of a furore in the U.S.A. and Canada; at the present time the American industry is producing nothing comparable in the range up to about 200 h.p.

The recent upsurge in the use of the diesel engine in American road transport has been largely confined to urban buses, in which the switch from petrol engines is not yet on a widespread scale, and to heavy trunk vehicles designed for sustained high speeds over very long distances. The increase in freight vehicles is evident in recently published figures, which show that whereas in 1954 fewer than 9,000 diesel-engined trucks were built, in 1958 the figure had risen to roundly 25,000; it was expected to be about 31,000 in 1959 and to have risen again to 36,000 in 1960. The increase in the use of diesel power is seen by one observer as a result partly of the introduction of improved engines by the Cummins and G.M.C. concerns, partly an increase in the vehicle fleets of operators who normally favour this type of power, and partly the need of operators to lower the cost of operation, which dictates the use of heavier more powerful vehicles that hold out the promise of longer life and lower maintenance costs.

It is unlikely that the average British truck will ever compete effectively in this field, which makes extensive use of tractors of up to 400 h.p., hauling two loaded articulated trailers, though some of the heavy British specialised types developed for export, given sufficiently wide-ranging transmission, would undoubtedly provide satisfactory performance. But dieselisation will inevitably spread to the medium-powered shorter-range goods vehicles and it is in this field, with its vast potential market, that the remarkable efficiency of the British vehicle could make its greatest impact.

Anticipating the further growth of the use of diesel units, several American engine and vehicle manufacturers, including Hercules, Caterpillar, International Harvester, Dodge, Ford, and White, have introduced or are developing ranges of diesel engines of suitable power.

City Transit Requirements

The urban bus field too is probably ripe for a mass swing to diesel types and offers good scope for British vehicles. An indication of what the large American bus operator is now looking for in

(*Continued on page 25*)

Two rear-engined G.M.C. vehicles—a Greyhound long-distance Scenicruiser and a Fifth Avenue Coach Lines 45-seat city bus—seen in Lexington Avenue, New York

New York street scenes: Two buses of 900 operated by Surface Transit (a Fifth Avenue Coach Lines subsidiary) seen on Broadway are both rather battered; a New York City Transit G.M.C. discharging—normally the front door is used only for loading—at South Ferry terminus, Whitehall Street—this operator had 1,200 G.M.C. and 730 Mack buses in service at the end of 1958; school buses, which greatly outnumber public service buses in America, must be treated with the greatest respect by other drivers—the two seen here outside the United Nations building are a 70-seat rear-engined Oneida and a 55-seat Dodge; and, extreme right, a Fifth Avenue Coach Lines service bus in typical winter conditions

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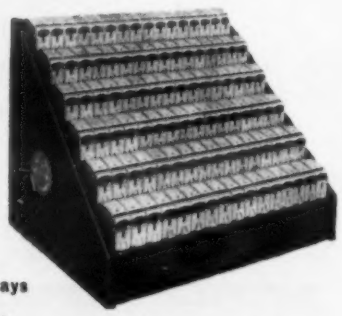

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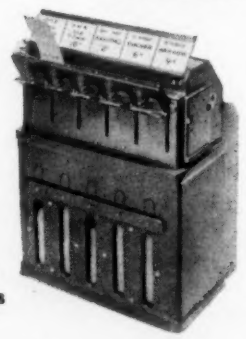

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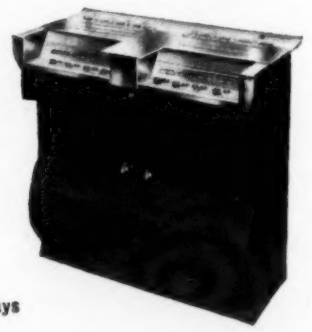

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new vehicles was given in a recent invitation to tender for the supply of new buses issued by the New York City Transit Authority. From a copy of this bulky document now in our hands we reproduce here some of the leading requirements of the specification. An interesting item from the preamble to the specific clauses intimated that the specification was intended to encourage contractors to exercise their ingenuity and design skill in supplying the most modern equipment; a "new look" urban bus was sought, "sharply changed in appearance from contemporary design of past years."

In general, the authority required 175 or 190 diesel-engined 48-seat single-deck buses for one-man operation in the dense traffic of the boroughs of the City of New York. It called for control features essential for fast, safe, efficient and comfortable operation, with greater riding comfort for passengers, greatly improved road and traffic visibility under all driving conditions and in all weathers, high manoeuvrability and adequate lighting and visibility for both seated and standing passengers. Further general requirements included economical operation and maintenance, implying high reliability and rapid dismantlement and reassembly.

International Harvester articulator, with tilt-cab petrol-engined tractor built to the 50-ft. maximum permitted length of New York State—New Mexico and California allow 65-ft. overall length; right, a Mack tractor and refrigerated 24-ton semi-trailer loading with perishables at N.Y. Central Railroad yard less than ½ mile from the centre of Manhattan

Rear Engine And Automatic Transmission

Among the specific requirements were a diesel engine positioned at the rear, automatic transmission, pneumatic suspension and an unladen floor height at the front entrance not greater than 34 in. Although a minimum engine power was not stipulated, the loaded performance required was for operation in heavy traffic, with an average of nine stops per mile, at an average speed of not less than 12 m.p.h. and a top speed of 40 m.p.h. It was further specified that the new buses should match the performance in acceleration, gradient ability and braking of competitive transport on city streets, implying adequate power, well-matched gearing, efficient braking and rapid loading and unloading. Two hinged lift-up doors to the upper half of the rear power-plant compartment and removable hinged doors to the lower half were specified, while means of starting and stopping the engine from the rear compartment as well as the driving position were also required.

Removal of the power plant as a unit, complete with radiator, was a requirement, as were devices to shut down the engine and prevent its being restarted in the event of overheating or low oil pressure. A mechanical engine-speed governor, a means of maintaining coolant temperature between 160 and 190 deg. F., a hydraulic variable-pitch fan, a fuel system designed and arranged to eliminate fire hazard, adequate filtration of intake air, fuel and lubricating oil and a 95-gal. (U.S.) fuel tank were also specified.

Although the specification did not tie down the bidder to a particular type of automatic transmission, it is obvious from the many requirements listed regarding heat exchangers, fluid specifications, fluid lines, leakproofing and so on that the authority had in mind a hydrodynamic torque converter and had had its troubles with such units in the past. The stipulation that the transmission should provide reliability without excessive maintenance should be more than adequately met by the various manifestations of the Wilson-type epicyclic box with automatic control now available in most makes of British urban bus, while the efficiency through this type of transmission equipped with automatic friction or fluid-friction clutch would, we venture to suggest, be a revelation to most American operators.

Electrical Requirements

Among electrical requirements listed was a generator of either direct or alternating current rated to cover 100 per cent of the maximum intermittent load and capable of developing at least 30 per cent and preferably 100 per cent of the maximum load at engine idling speed. A transistorised voltage regulator was stipulated as also was fluorescent lighting for bus interiors, while it was obviously necessary for exterior lights, including marker lamps, to conform with current New York regulation and practice. The air-pressure system specified was orthodox and implied that entrance and exit doors and the windscreen wiper, as well as the service brakes, would be air operated. Self-parking variable-speed windscreen wipers with blades operating over a 1,150 sq. in. area of windscreen were specified.

Air-operated service brakes were required to produce a rate of deceleration increasing smoothly from zero to 4.75 m.p.h. per sec. and to have sufficient capacity to produce, in emergency conditions, a minimum deceleration rate equivalent to a stopping distance of 22 ft. from a speed of 20 m.p.h. (about 60 per cent) on clean, dry road. The handbrake was required to produce three consecutive stops under similar conditions equivalent to about 27 per cent and was also required to be a transmission brake operating on the axle end of the propeller shaft. The pneumatic suspension specified had to be adequately damped so as to eliminate bounce, sway, roll and other objectionable riding habits and the levelling valves used were to be subject to approval. Suitable means were required of lifting the bus by the chassis without damage and a suitable plan for a rear-lift tow was also required.

Structural Specification

The specification clearly envisaged an integrated chassis-body structure of stressed-frame construction and with underframing stiff enough to obviate floor flexing. Aluminium alloy framing was mentioned, though clearly steel would also be considered provided the specified maximum unladen running weight of 19,000 lb. was not exceeded. Exterior panels were required to be riveted to the body frame and all parts used, including nuts, bolts and so on had to have suitable corrosion-resistant treatment. Thermal insulation between inner and outer side and roof panels was stipulated. Interest in structural plastics was shown by a request to bidders to quote alternatively for metallic and fully moulded plastics stepwells for entrance and exit doors and to incorporate plastics or plastics-coated battery trays under the floor.

Apart from kick-out safety glass in windows (as emergency exits) and windows high enough to provide good visibility for standing passengers, body interior trim and furnishing followed fairly conventional universal practice. A major departure from British practice in urban buses was the requirement to fit unupholstered shaped seats of moulded plastics, for which all-through impregnated colour was also specified. A 30-in. wide entrance door ahead of the front axle and a 27-in. wide exit door ahead of the rear axle, both air operated and under the driver's control, were specified, with various protective interlocks to prevent the bus being driven with the rear door unlocked and warning lamps to indicate when either door was not secured.

A huge luggage compartment is a feature of the air-suspended twin-engined G.M.C. Scenicruisers operated by Greyhound on long-distance express services, one of which is seen loading at the New York 34th Street terminus; right, current exit doors of New York buses are designed to thwart entry by would-be fare-dodgers—the driver's control merely unlocks the exit door, which can then be pushed open from inside, closing again automatically after a short delay period

MECHANICAL ENGINEERING RESEARCH

Railway Wheel Adhesion

FURTHER developments in the work of the National Engineering Laboratory, East Kilbride, are announced in *Mechanical Engineering Research, 1958*, which is published by H.M.S.O., price 4s. 6d. (81 cents in U.S.A.) The report says that laboratory tests suggest that the adhesion between railway wheels and rails can be increased considerably by applying a solution of sodium metasilicate to the surfaces. Full-scale tests are now desirable to see whether similar improvements can be obtained in practice. The laboratory's Deuce computer is being used in the preparation of new international tables for steam, covering temperatures up to 800 deg. C. and pressures up to 1,000 atmospheres.

Air-lubricated bearings have been used experimentally in place of the normal slideways of a horizontal milling machine. A much smaller motor is required to drive the machine table and stick-slip friction is eliminated. Manufacturers of control valves for hydraulic presses and other fittings for oil hydraulic circuits have used a special rig at N.E.L. to measure the pressure losses in their products. The data obtained will enable users of these fittings to design more economical circuits than at present.

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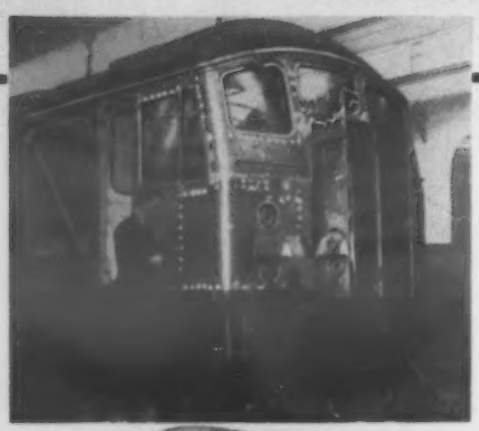

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ALUMINIUM ALLOY LAUNCH

For Lake Tanganyika Service

AN aluminium-alloy survey and patrol launch, recently designed and built for the Belgian Government by Universal Shipyards (Solent), Limited, for service on Lake Tanganyika, is based on the company's standard Two-Way Tension system. The overall length of the craft is 40 ft., with a beam of 11 ft. 6 in. and a draught of 2 ft. 9 in. The hull is of riveted construction of 10-s.w.g. aluminium alloy to specification NS5 supplied by the British Aluminium Co., Limited. Aluminium was specified to avoid damage by marine borers, wet or dry rot and the other forms of deterioration found in a tropical climate. Steel

The launch at speed on the Solent during pre-delivery trials

would have been too heavy, not only for speed, performance required and draught needed in shallow waters, but for the 1,200-mile overland rail journey between Lobito and Lake Tanganyika.

The customer specified a normal cruising speed of 12 knots with a maximum of 15 knots and this performance is comfortably achieved with the twin Perkins P6 diesel engines, each of which develops 65 h.p. at 2,000 r.p.m. and operates through a direct-drive oil-operated gearbox. The launch was designed to meet the requirements of Lloyd's Register of Shipping for the classification 100 A1. It provides comfortable day accommodation and saloon settees can be converted to sleeping-berths if required. The saloon is spacious with large forward and side windows. On the port side there is a dinette arrangement, convertible to a berth, and, on the starboard side, there is a full-length settee.

Wheelhouse and Controls

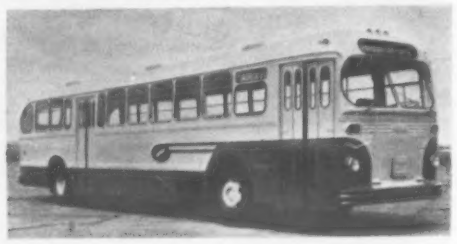
On the port side at the after end of the saloon there is a small galley with a paraffin cooker, stainless steel sink and electric refrigerator and on the starboard side, a toilet compartment fitted with w.c. and washbasin. An enclosed wheelhouse aft of the saloon has the steering position on the port side and space for radio equipment on the starboard side. All the engine controls and instruments are conveniently grouped together in front of the helmsman, who is also supplied with a Kent clear view screen, Marine Searchlight electric klaxon and Sestral Minor compass. The single-lever com-

(*Continued in next column*)

A.E.C. DIESELS IN CANADA

Standard in Can-Car Buses

BRISK business is now being done by A.E.C., Limited, in diesel engines for fitting into Canadian buses and coaches manufactured by the Canadian Car and Foundry Company, which has for some time standardised on the A.E.C. diesel for its heavy-duty passenger vehicles. As in Britain some years ago, many Canadian cities have been replacing trams with motorbuses and in the majority of recent cases the decision has been taken to equip with diesel-engined vehicles. This was so in Montreal, when in 1958 Montreal Transportation Commission placed an order with Can-Car for new diesel-engined buses worth over



A Canadian Car and Foundry Company integral bus with underfloor A.E.C. 11.3-litre diesel engine

£3 million, all of them powered by British-built A.E.C. engines.

Montreal took delivery of its first A.E.C.-engined vehicle in 1931, since when more than 2,000 similarly equipped passenger vehicles have been delivered to various Canadian operators. Montreal is the leading Canadian A.E.C. operator, the bulk of the 325 buses ordered for delivery in 1958 being powered by the 11.3-litre A.E.C. engine, but Toronto also operates a large A.E.C.-engined fleet and Canadian Car and Foundry Company also supplies buses to most other leading operators.

(*Continued from previous column*)

bined throttle and gear controls are led from the engines by Bloctube controls. The Bishop steering gear operates through shafts and bevel gears giving positive linkage to the rudder.

The aluminium-alloy wheelhouse roof is extended aft over the engine cases, which are of timber construction lined with glass-fibre sound-insulating material. Aft of the engine cases there are port and starboard boarding steps and a large open cockpit with seating accommodation arranged around the after end. The two welded aluminium-alloy fuel tanks, each with a capacity of 100 gal., are installed in the stern under the after seats. Right forward there is a large bosun's store, separated from the saloon by a watertight bulkhead.

As the craft will be operating in a tropical area, special attention has been paid to ventilation. All the windows open, and cowl ventilators have been fitted above the saloon and wheelhouse overheads, which are in turn insulated with glass fibre and lined with Fromoplas.

Sketched at Guy Motors Ltd.

Hoisting a cab moulded in polyester/glass fibre material on to a Guy Warrior chassis. Structural plastics are widely used by Guy Motors for the cabs of their famous vehicles.

Sketch by John Ross, copyright of:
B.I.P. Chemicals Limited, Oldbury, Birmingham

IN NEW SOUTH WALES

Increased Net Income on Railways

DURING 1958-59 the net income of the 6,103-mile New South Wales Railways increased appreciably over last year's figures. This was largely due to the increased volume of freight business handled with the consequent increase in operating revenue. Overall freight services, measured in ton miles, showed an increase of 6.4 per cent. Although freight earnings on coal, coke and fodder were noticeably less than for last year, earnings rose sharply on the freighting of wheat, flour, wool, general goods, ores and concentrates.

Passenger traffic continued to decline, some 4½ million fewer passengers being carried on rail. While it must be conceded that frequent air services operating from most major towns have contributed towards this trend, the continual improvement in roads, the huge increase in private motor car ownership, and the extension of suburban shopping centres, have been major factors affecting passenger business. The total of concessions allowed was £485,634. This figure was made up of direct losses of revenue incurred in the transport, at reduced rates, of stores stock, of stock travelling to and from agistment and the carriage of fodder for starving stock (£154,703); rebates of freight to consignors of mill products, export flour, rice, canned fruits, jams and other goods (£295,981); and concessions to blind ex-servicemen and their guides (£34,950).

Lower Net Operating Expenses

Despite a continued rise in wage costs during the year, net operating expenses were £1,221,899 lower than for 1957-58. The benefits of dieselisation, improved methods of operation, and greater efficiency arising from the cumulative effects of planned capital improvements, all contributed, in varying degrees, to a saving of operating expenses for the year. The profit on operations for the year was £4,828,542, an increase of £2,929,590 on last year's figures. This profit, however, was not sufficient to offset the heavy fixed charges, and the net result was a deficit of £6,449,363, an improvement of £1,735,820 on the previous year's figures.

Within the limits of capital fund allocations, the department has continued its programme of modernisation. On the Hornsby—Gosford electrification project, the section to Hawkesbury River was opened for traffic by April, 1959, seven weeks ahead of schedule. Work on the Clyde—Carlingford electrification project has been commenced while considerable improvements in the Port Kembla area, to meet the requirements of that port's industrial growth, are being carried out. Many new units of rolling stock have been received and placed into service, chief among them being the interurban stainless steel trains for specialised passenger services on the western line and air-conditioned diesel trains for use between Werris Creek, Moree and Burren.

Land Use

Continued emphasis was placed on the efforts to increase revenue from the lease of railway land not immediately required for departmental purposes. The net revenue from this source for the year exceeded the estimate by £8,666 and reached £561,166, as compared with £460,783 for the previous year. The most pressing problem involving staff concerned the introduction of diesel motive power. The gradual and progressive introduction of diesel locomotives into the system has caused, and will continue to cause, changes in the methods of operation and maintenance at the various locomotive depots. These changes will necessitate adjustment of staff who were previously engaged on the maintenance and servicing of steam locomotives which are now being displaced. Whilst it is fully appreciated that transfers, where necessary, will cause varying degrees of hardship to the staff involved, every endeavour will be made to minimise inconvenience to the individual employee.

With the State's economy expanding, its population increasing, and emphasis being placed on the decentralisation of its industry, the department is being geared to meet the changing needs of the changing times. To secure a large part of the added traffic that will be generated, the latest annual report, from which the foregoing figures have been extracted, predicts that rates will be established that will reflect the inherent advantages of railways in low-cost transport operation.

Electric Locomotives to be Built in India

ENGLISH ELECTRIC EQUIPMENT TO BE USED

THE first electric locomotives to be built in India will soon be begun at Chittaranjan Locomotive Works. Britain will play a major part in the supply of equipment. The English Electric Company has been awarded a contract by the Indian Railway Board for the complete electrical equipments, including control equipment and traction motors, for 10 3,600-h.p., 1,500-volt d.c. 5 ft. 6 in. gauge units.

English Electric designed and built complete locomotives of this type for the Central Railway of India in 1955. Their success in service on the Bombay-Poona and Bombay—Igatpuri electrified lines has encouraged the Railway Board to make them the pioneer electric type for manufacture at Chittaranjan. The mechanical parts of the locomotive will be built there, and all the work of fitting, erection and testing will be carried out in collaboration with English Electric staff.

Chittaranjan

The factory at Chittaranjan was planned and built primarily as a steam locomotive works after the war of 1939-45 in association with British locomotive manufacturers, including Vulcan Foundry, now part of the English Electric group. Although the production of steam locomotives will continue there for the time being, Chittaranjan is now faced with the same conversion problem which the British industry and British Railways have had to solve in the last few years—the changeover from steam to newer forms of rail transport.

The present order will assist Chittaranjan in this task by reinforcing the close association between British and Indian production engineers which has been a decisive factor in building up India's increasing output of home-built locomotives and railway material over the last ten years.

Design Features

The original locomotives of the type chosen were equipped with regenerative braking and haul 560-ton passenger trains at 68 m.p.h. at level track. When operating in freight services the locomotives are required to work 2,000-ton trains against a 1 in 100 gradient at 30 m.p.h. The electric equipment for the new locomotives will be so designed that should there be a failure in the control equipment, operation is ensured by cutting out half of the control gear and operating with the other half in circuit only.

The new Co-Co locomotives will have mechanical parts and performance characteristics closely resembling the seven earlier locomotives. Principal dimensions and data include: length over buffers, 67 ft. 9½ in.; overall width, 10 ft. 2½ in.; overall height (pantograph housed), 14 ft. 1 in.; and rigid wheelbase, 15 ft. 9 in. The weight in working order, all available for adhesion, is 123 tons, the maximum axle loading 20.5 tons, and maximum tractive effort 69,000 lb. The continuous tractive effort is 38,900 lb. at 30 m.p.h. Air and regenerative braking is provided on the locomotive and the vacuum brake on the train.

Heavy Vehicle and Railcar Transmission

(Continued from page 10)

tion from a central position giving progressive changes up and in the opposite direction downward changes. The gear actually in engagement is indicated on an illuminated panel. Features incorporated to make operation foolproof are a device which prevents downward changes at too high a speed, which might damage engine or transmission, and automatic selection of the starting gear when the vehicle is halted. Removal of the key from the controller automatically selects neutral irrespective of the gear engaged when the vehicle is brought to rest. The latest C56 controller for the eight-speed gearbox is an easy-to-install simplified version, which omits the quick neutral-selecting feature but includes devices that prevent engine starting except when neutral is selected and shut down the engine should air pressure fall too low to sustain traction.

Apart from the saving of driver effort and its potential benefit of improved road safety, this easily and positively controlled transmission system takes the uncertainty out of those rather difficult operations in a fully loaded vehicle—changing up on upgrades and changing down on downgrades (for engine braking)—making for greater efficiency and safety and eliminating excessive transmission shocks. The greatest efficiency and economy of operation of a vehicle fitted with the RV30 gearbox can be achieved, even with unskilled drivers, when an engine-speed indicator is also fitted. With such an arrangement the engine can be operated within its optimum speed range for the maximum amount of time, rising or falling speed towards the extremes of a marked portion of the indicator dial calling for appropriate movement of the gear lever.

Automatic Heavy-Duty Transmissions

VS automatic control is currently offered as an alternative to semi-automatic control on the S.C.G. heavy-duty transmissions for tractors, construction vehicles, light locomotives and railcars. These are the RV48 and RV51, both designed as close-ratio units for coupling with S.C.G. hydrodynamic torque converters. The RV48 with matched converter is designed for maximum input of 275 b.h.p. at 2,100 r.p.m., while the RV51 will deal with 400 b.h.p. at like speed. The larger unit has been designed specifically for use in heavy earthmoving and logging equipment, cranes and haulage vehicles, where maximum tractive effort at starting, smooth acceleration, high efficiency and ease of control are essential transmission requirements.

The mechanical section of the unit embodies all the usual desirable features of the S.C.G. epicyclic gearbox and provides ratios of 3.83, 1.96, 1 and 0.719 to 1 forward and 4.36 to 1 reverse. Independent mounting faces are provided on the sides, front and rear to take a variety of bearer bracket types and a front-end mounting sleeve is available. Control can be automatic through the VS equipment, or semi-automatic pneumatic or electro-pneumatic. The hydraulic section is an 18-in. S.C.G. single-stage converter-coupling based on the Schneider system, which gives a torque multiplication at stall of 3 to 1. Their combination in the RV51 provides an extremely smooth and efficient transmission having substantially constant-horsepower characteristics over a wide speed range.

As a result of the merger of the power cable businesses carried on by Enfield Cables, Limited (a wholly-owned subsidiary of Enfield Rolling Mills, Limited), and by Standard Telephones and Cables, Limited, respectively, a new company has been formed, Enfield-Standard Power Cables, Limited. The new company, which commenced operations on January 1, has its registered offices at Connaught House, 63 Aldwych, London, W.C.2, and main works at Brimsdown. Mr. F. C. Wright, managing director of Standard Telephones and Cables, and the Hon. John Grimston, managing director of Enfield Cables and Enfield Rolling Mills, will alternate as chairman of Enfield-Standard Power Cables.

B.U.T. in South America

Now in service on the Colombo-Santa Cruz section of the metre gauge C.M.F. Brazileiro-Boliviana railway, this articulated diesel railcar was built by D. Wickham & Co. Ltd., and is powered by two 150 b.h.p. B.U.T. units.

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MAIN-LINE DIESELS FOR SUDAN

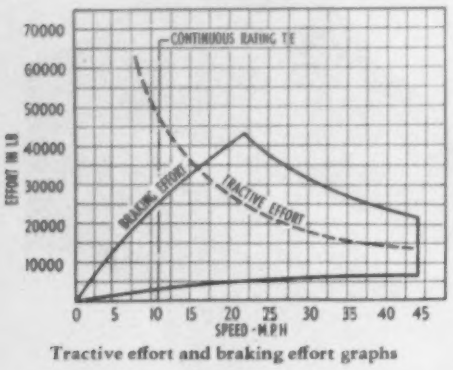
Units of 1,850 H.P. on 3 ft. 6 in. Gauge

MOST recent addition to the locomotive stud of the Sudan Railways is No. 1000, the first of a new class of 15 diesel-electric units now under construction by the English Electric Company at the works of the Vulcan Foundry, Limited, Newton-le-Willows, Lancashire. Over the past 20 years the freight tonnage handled by the Sudan Railways has more than doubled, and these locomotives, which develop 1,850 h.p., are intended primarily to meet the shortage of motive power that this rapid growth of traffic has engendered.

The most powerful machines ever acquired by this 3 ft. 6 in. gauge system, they are designed to work singly with the heaviest passenger and goods trains. One of their principal duties will be to haul cotton trains of up to 1,500 tons from Khartoum and the interior to Port Sudan on the Red Sea. A feature of this route is that it reaches an altitude of 3,013 ft. at summit, 80 miles inland from Port Sudan, and thereafter falls continuously towards the coast with a ruling gradient of 1 in 140.

Factors in Design

This factor has been taken into consideration with the new design, and to avoid excessive wear



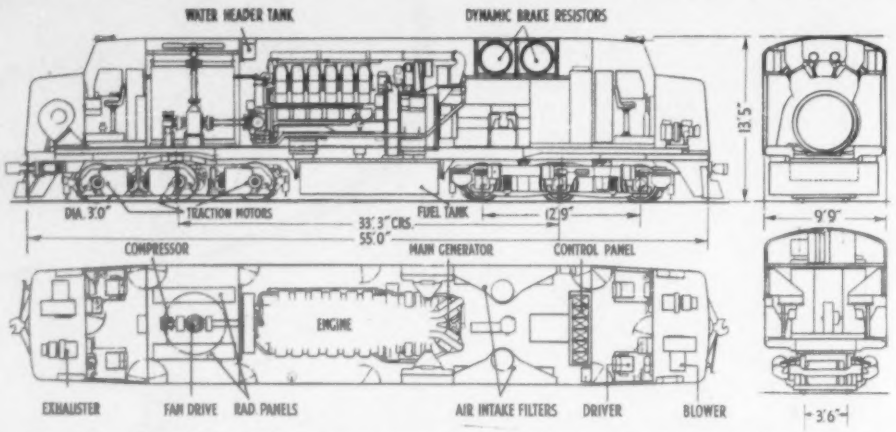
Tractive effort and braking effort graphs

on tyres and brake blocks and help control trains on this long descent the class has been equipped with special dynamic braking. Another factor which has had to be taken into account is the climate which ordinarily registers 120 deg. F., coupled with a relative humidity of 47 per cent. Heavy dust storms are also common and have necessitated special precautions.

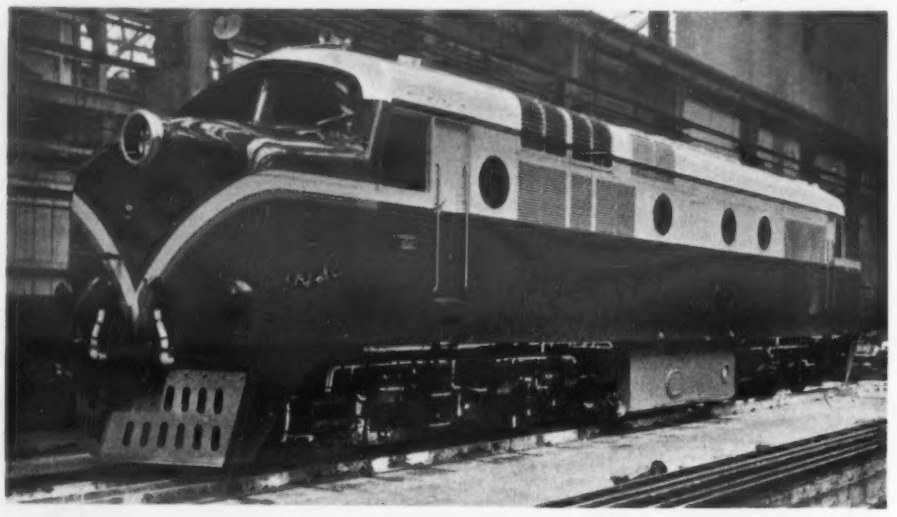
However, despite the problems of temperature and altitude the engine is capable of developing its true rating at site by virtue of the after-cooling equipment and specially matched pressure chargers with which it is fitted. An interesting feature of the engine is that the charge air cooling water, after passing through the after cooler, is fed through the heat exchanger in which the engine lubricating oil is cooled. Thus one water circuit caters for both duties. The engine jacket cooling system forms a second and separate water circuit.

The locomotive has a full bodied superstructure which is carried on two three-axle bogies; it weighs 98.75 tons in working order. It is powered by an English Electric 12CVST engine and has six axle-hung nose-suspended traction motors. The engine is rated at 1,850 h.p. at 850 r.p.m.—and an identical engine has been demonstrated at 2,300 h.p. on the test bed. The locomotive has a maximum starting tractive effort of 63,000 lb., with a continuous rating of 48,000 lb. at 11.6 m.p.h., and is limited to a maximum service speed of 45 m.p.h. The weight is made up as follows: equipment 42.9 tons, superstructure and underframe 26.55 tons, cast steel bogies 21.5 tons, and services 7.9 tons. The axle loading falls just within the permitted maximum of 16.5 tons.

The bogies incorporate swing link bolsters and have underslung equalising beams. The superstructure weight is transmitted to the two bolsters, which in turn rest on laminated elliptic springs carried by spring planks suspended from the bogie frame by inclined swing links. Each frame is supported on four groups of coil springs located on the equalising beams with the ends bearing on hardened steel slippers located beneath the axleboxes. With the exception of the traction motors all the equipment is carried in the superstructure. The section between the two driving compartments contains the radiators, radiator fan, gearbox, power unit, dynamic brake resistance unit, pressurising fans, batteries and control cubicle. Each nose compartment contains an exhauster and traction motor blower; the fuel is carried in a 1,600 gal. tank suspended from the underframe between the bogies.



Elevation of British-built diesel-electric locomotives for the Sudan, showing disposition of units



English Electric-Vulcan Foundry diesel-electric locomotive for 3 ft. 6 in. gauge Sudan Railways

Transport facilities in the Sudan

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Control

A single control handle at the driving position regulates the power by varying the engine speed and the field excitation of the main generator. Movement of the control handle actuates a self-lapping air valve which admits air at a pressure corresponding to the degree of movement to a spring-loaded piston controlling the speed setting of the engine governor. Field excitation of the main generator is adjusted by a servo regulator controlled by the governor. This varies the generator field strength so that the load imposed on the engine is always equal to that corresponding to the set engine speed, irrespective of the road speed of the locomotive.

The load regulator is also used to initiate field weakening of the traction motors to provide full engine power over the widest possible locomotive speed range. This system of continuous speed-torque control developed by English Electric has now been adopted as standard on British Railways main-line diesel electric locomotives. It has the important merit that the engine never runs at a higher speed than is needed to produce the power demanded, and therefore keeps wear and tear and fuel consumption to the minimum.

Electrical Equipment

The traction motors are connected in three parallel groups of two in series, and the mid-points of each pair of motors are connected together. The mid-point connections are used in conjunction with

(*Continued on page* 30)

400 B·H·P
DIESEL
ELECTRIC
LOCOMOTIVE

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A.E.C. MARSHAL

Goods Chassis for Export

INTENDED primarily for a growing export market, the Marshal introduced this week by A.E.C., Limited, is a rugged medium weight six-by-four chassis suitable for a gross weight of 44,800 lb. (20 tons); it has been designed particularly for those countries—often with a large proportion of unmade roads—where rear bogie loadings are limited by legislation and full advantage cannot be taken of the heavier A.E.C. Mammoth Major six-wheeler. The chassis is based on the current A.E.C. medium-weight range, the main components being common to those of the Monarch VI (Mercury) where possible. Apart from the variable leverage handbrake the entire front end of the Marshal is similar to that of the Monarch, greatly simplifying service and provision of spares.

At the rear, however, an Eaton-Hendrickson fully articulated double-drive bogie is incorporated. Here again maximum interchangeability of parts has been borne in mind and the axle casings are machined so as to accept standard Monarch hub and brake assemblies. Although it is produced essentially for overseas operation, it is expected that there will also be a considerable home demand for a tough medium-weight six-wheeler, which can operate up to the maximum United Kingdom legal gross weight.

A.E.C. six-by-four Marshal chassis developed primarily for overseas service at a gross weight of 20 tons

Two Wheelbase Lengths

The Marshal is available in wheelbases of 11 ft. 9 in. and 15 ft. 7 in. The engine is the well-proved A.E.C. AVU470 incorporating monobloc construction and wet cylinder liners, developing 112 b.h.p. at 2,000 r.p.m. or 125 b.h.p. at 2,200 r.p.m. In unit with the flexibly mounted engine is the five-speed synchromesh gearbox.

The suspension of the rear bogie is by means of four rubber "load cushions" which, by virtue of their shape, give progressive action. The underside of the pair of load cushions on each side is attached to a large bracket in which is pivoted the equalising beam which, together with radius arms, locates the axles. Additionally, cushioning and alignment are accomplished by four vertical drive pins, which are attached to the frame mounting brackets and pass through the rubber spring units under which they are encased in rubber bushes mounted in the main unsprung brackets. Lubrication has been eliminated by the complete rubber bushing of all oscillating points.

Transmission

The twin driving axles are of the single-reduction spiral bevel type; alternative ratios of 6.68 and 8.6 to 1 are available. A power divider, to transfer the drive line to the second axle, consists of an input shaft (which receives the drive from the propeller shaft), on which are mounted two helical gears driven through an inter-axle differential. The forward gear meshes with another mounted on the offset drive shaft to the second axle, while the rearward one drives the first axle pinion shaft. The whole unit is mounted in an offset forward extension of the leading axle pinion housing.

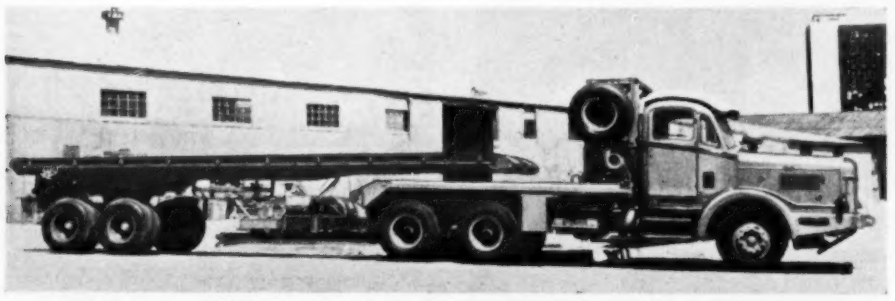
The third differential ensures the transmission of equal torque to both axles at all times, reducing tyre scrub when cornering and so on. For deep mud, icy conditions or operating over bumpy ground beyond the limits of wheel articulation, the inter-axle differential may be locked by a lever on the steering column, giving maximum traction in these conditions.

The front brakes are direct air operated while those at the rear are controlled by a hydraulic master cylinder operated by an air pressure diaphragm chamber. Standard tyre equipment is 10.00-20 12-ply rating single front and 9.00-20 12-ply rating twin rear.

For Oilfield Service

WORK OF THORNYCROFT VEHICLES

OILFIELD work is among the most exacting of all services obtained from motor vehicles, demanding rugged and powerful design. A number of interesting units has recently been supplied by Transport Equipment (Thornycroft), Limited, of Basingstoke, Hants, to the Yacimientos Petroliferos Fiscales; this organisation is the Argentine petroleum refining and distributing firm and it has used Thornycroft vehicles for over 32 years. The latest units comprise a variety of Big Ben and Trusty types, all fitted with oilfield bodies. Although the Trusty types have 16 ft. 2 in. wheelbase, they are used as tractors; the balance of the order comprises 21-ft. wheelbase Big Bens. All these are equipped with Thornycroft-built reinforced resin cabs, hydraulically operated power assisted steering, Darlington 50,000-lb. winch, drawbar gear, trailer brake gear and a combination oilfield body manufactured by the York Trailer Co., Limited, Corby, Northants. The specification of this equipment includes a mainly steel body and 4½ in. diameter gin poles with the inner and outer rails of the body fabricated to form troughs to carry them.



Thornycroft Big Ben oilfield truck with self-loading body and fifth wheel together with a Dyson twin-axle semi-trailer

British Equipment

The latest Trusty order was for 20; they are the 6 by 4 left-hand drive type with tractor wheelbase. Each has a works-built all-steel cab having an insulated roof and back panel, a power take-off and drive with controls and mountings for a Woodfield Senior winch and combination oilfield body built by Hands-England Equipment Co., Limited. These vehicles are to be supplied complete with headache rack, fifth wheel, tail roller, gin poles and chains, and mainly steel decking. This vehicle was described in MODERN TRANSPORT for June 20, 1959.

Several Big Ben oilfield trucks supplied by the Thornycroft Argentine branch to the Shell Company of Argentina, Limited, for off the road operations are now at work in the oilfields at Comodoro Rivadavia. As solo machines they carry Ideco-Woodfield Hydrair H-20 well-servicing hoists, but as articulated outfits, the tractor is attached to a low-bed three-axle semi-trailer with self-loading body on which is loaded a Wagner Morehouse T-2-37 draw works unit and 90-ft. telescopic mast. The total train weight is then about 40,000 kg. or 39½ tons.

At the present time Thornycroft has several substantial orders for oilfield trucks in hand for Halliburton, Limited, for export to Turkey and Yugoslavia; others ordered by Esso Petroleum are designed to take either oilfield bodies or bulk water tanks, both manufactured by Hands-England, Limited. The special version of the Big Ben export heavy-duty chassis known as the Sandmaster is also building in quantity for Gordon, Woodroffe and Co., Limited, of Tripoli and Benghazi and a substantial number has been delivered. Others are in hand with either oilfield bodies or bulk tanks for shipment to Yugoslavia.

Another Thornycroft speciality is the manufacture of airfield fire crash tenders; the basis is the well-known Nubian 6 by 6 cross-country chassis, most of which are equipped with the Rolls-Royce B81 petrol engine. They are ordered mainly through Pyrene Co., Limited. Orders recently completed or in hand for these crash tenders include those for shipment to Burma, Canada, Ceylon, Denmark, Hungary, India, Iraq, Karachi, Lebanon, Russia and Yugoslavia.

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The Leyland "Leopard" chassis . . . suitable for a 30 ft. x 8 ft. coach body . . . easily takes pride of place as the biggest profit-earner on the road today. Fast, powerful and weighing only just over 4 tons, it is built for safe, high-speed touring over modern motorways, and has superb hill-climbing ability in mountainous territory. The remarkably comprehensive design has everything; the famous Leyland 0.600 underfloor diesel, shaft or gear drives to all auxiliaries, optional 2-speed rear axle with electric gearchange, powerful anti-fade air brakes for top safety, maximum gross laden weight of only 11 tons . . . these are just a few of the features that put the "Leopard" in a class of its own

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Sales Division: Hanover House, Hanover Square, London, W.1. Telephone: MAYfair 8561

Birmabright for the Bo-Bo

This complex "Bo-Bo" fuel tank, made for British Railways by Southborough Sheet Metal Works Ltd., was fabricated from Birmabright sheet principally to save weight on a heavy locomotive. An idea of the complexity of the fabrication is given by the fact that there are 650 feet of weld, two-thirds of which are inside the tank. The excellent weldability of Birmabright was of considerable help in the satisfactory production of this complicated job. Have you got full information on Birmabright corrosion-resisting aluminium alloys?

Birmabright

BIRMABRIGHT LIMITED

BM 261

Woodgate Works · Birmingham 32

ACCELERATIONS IN NEW ZEALAND

Diesel Traction Possibilities

ON February 18 the 3 ft. 6 in. gauge New Zealand Government Railways operated a special train conveying the Minister of Railways, railway officers, representatives of the press, and other guests over the 424.7 miles from Auckland to Wellington in the record time, for a locomotive-hauled train, of 11 hr. 34 min. This was almost 2½ hr. faster than the quickest regular schedule on this route. Two days earlier, the same train had run from Wellington to Auckland in 11 hr. 45½ min.

The occasion was a trial run from Wellington to Auckland and back to explore the possibilities of instituting a fast daytime service between the two cities. At a dinner in Auckland, Mr. Michael Moohan, Minister of Railways, said that a fast daytime service would be the Railways Department's answer to the private car. He also envisaged a faster night-train service covering the distance in about 12 hr. compared with the present 14 hr. The general manager, Mr. A. T. Gandell, commented that very valuable practical results had been obtained from the trial runs. The aggregate running time on the record southbound trip was 10 hr. 23 min., a gain of 40 min. on the schedule that had been laid down. The 150-ton train, comprising guards van and four passenger cars, was well ahead of time at each of the stopping places—Frankton, Taumarunui, Taihape and Palmerston North—but was held at each stop until the scheduled departure time in order to minimise disturbance to other traffic.

Up to 60 m.p.h. Running

On the northbound run, two 750 h.p. A1A-A1A Dg class diesel-electric locomotives, Nos. 754 and 753, were used. Their aggregate running time was 11 hr. 1½ min., an average speed of 38.5 m.p.h. Maximum speeds on some sections had not been as high as expected, but the final 85.9 miles from Frankton to Auckland were covered in 109½ min. from start to stop, a gain of 12½ min. on schedule. On this section the locomotives attained their maximum speed of 60 m.p.h. and ran for many miles at between 55 and 58 m.p.h.

A Da class 1,425 h.p. diesel-electric locomotive, No. 1436, was used on the southbound run from Auckland to Palmerston North, whence the two Dgs took over for the final 85 miles to Wellington.

Special train which covered the 425 miles from Wellington to Auckland in 11 hr. 45½ min. leaving Palmerston North

The total weight of the train, including the locomotives, was 290 tons when hauled by the Dg class, but only 228 tons when hauled by the Da locomotive. This factor was material in contributing to the exceptional uphill speeds attained in this direction. It is reported, however, that the locomotive was extended to its full capacity only on the steepest grades, as from Raurimu to National Park, where a steady 33-34 m.p.h. was maintained on the 1 in 50 through the many 7½-chain radius curves. The time for the 7.2 miles from Raurimu up to National Park was an unprecedented 12 min. 48 sec. As a result the 32-mile climb from Taumarunui was cleared in well under the hour and Ohakune, 50.2 miles, was passed in 82 min. from the Taumarunui start, 14 min. early.

These runs were the fastest ever made by ordinary trains over this route, which rises in three places to summits in excess of 2,600 ft. above sea level, but faster times were achieved on some inspection railcar runs in 1938. In February of that year a Wairarapa type six-wheel railcar *Arai-te-Uru*, powered by a 120 h.p. petrol engine and governed for a maximum speed of about 65 m.p.h., was taken through in a running time of 9 hr. 25 min. The overall time is not recorded.

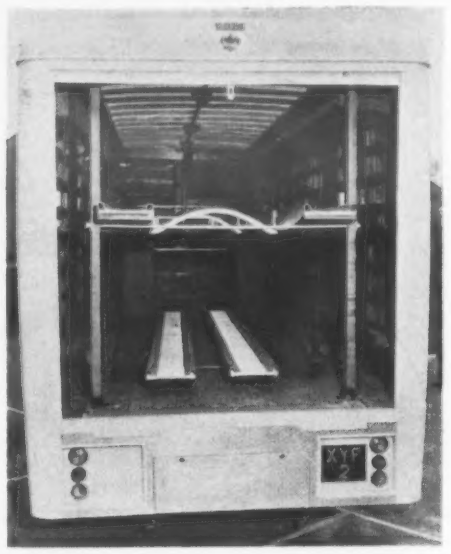
An even faster run was made in August, 1938, by the general manager's 3½-ton four-wheel inspection railcar, a 60 h.p. Leyland Cub motor coach adapted for railway purposes. On this occasion the 425 miles were covered in 10 hr., or in a net running time of 8 hr. 56 min.

NEW TRANSPORTER DESIGN

For Racing Cars

BASED on an underfloor-engined Albion Aberdonian bus chassis, a new design of combined transporter and workshop for racing cars will make its début at major European circuits this year. It will convey and service three Formula 1 Cooper racing cars for the Yeoman Credit Racing Team, a newly formed venture prompted by Yeoman Credit, Limited, of London, which handles vehicle hire purchase finance. The vehicle, which has two-deck bodywork in the form of a pantechnicon with integral cab, is powered by a 104-h.p. six-cylinder Leyland horizontal engine with six-speed gearbox mounted below frame level. The bodywork is by W. and T. Robson, Limited, of London, E.C.1.

The method of loading and storing the three cars has been devised by utilising the upper internal



Interior of vehicle with storage ramps in normal position and tail ramps stowed on the floor

floor in conjunction with aluminium ramps. The floor is hinged at the front end so that the rear end may be lowered to form a continuous ramp with the tail ramps. After two cars have been winched on to the top floor it is raised to its normal horizontal position and secured. The third car is then winched up the tail ramps on to the lower deck and housed at the rear end of the vehicle. This leaves room at the forward end for the workshop.

Access to the workshop is provided by two doors in the sides of the vehicle just behind the cab. Sixteen spare wheels are carried along each side of the body, and other spares are stored in the Luton extension of the body above the cab. Interior lighting is provided by a translucent glass fibre roof, reinforced to enable the vehicle to be used as a grandstand during races. The roof is accessible by means of detachable ladders, and on the near side of the vehicle about 9 in. below the roof and running the length of the body there is a recess for a sunblind. A similar but smaller vehicle for Formula 2 cars is also in service on a Thames Trader chassis

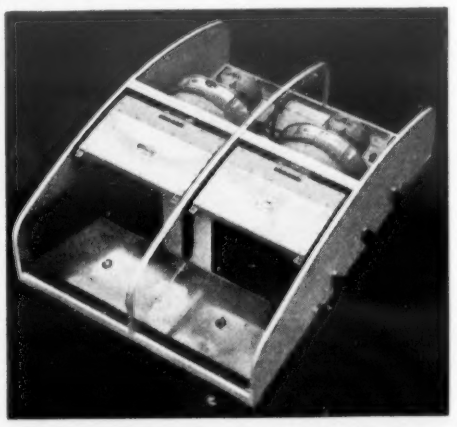
★

DIESELS FOR SUDAN

(*Continued from page 28*)

relays to form a device that is sensitive to wheelslip and so able to improve adhesion. The traction motors serve as generators when dynamic braking is used.

Under this condition the traction motor fields are excited from the main generator and the output is dissipated in resistance banks mounted in a removable roof section. The dynamic brake resistances have cooling air forced through them from two motor-driven fans and the degree of braking is under the control of the driver so that he can



Dynamic brake unit on new locomotives for Sudan Railways showing resistance elements in the front section and motor-driven fans behind

select the amount of effort required to match the trailing load and road speed conditions. Automatic safeguards prevent excessive braking currents should the driver enter dynamic braking at excessive speeds.

The livery selected for these locomotives is unusually elaborate and colourful. The lower half of the superstructure, including the nose compartments to roof height and the fuel tank, is standard Sudan Railways blue. Above the waist to roof level is yellow and at each end this is continued down to the centre of the buffer beam in the form of a broad band edged with green and red. A further band of green divides the yellow side panels from the roof, which is white. The bogies and buffing gear are black, the cowcatchers red, and the headlamps and warning horns silver.

At each end a large brass plate indicates the locomotive running number in raised brass characters in Arabic, and a similar oval plate affixed to the locomotive sides displays the Arabic insignia for Sudan Railways.

"This 'DPA' Distributor type
Fuel Injection Pump
has many advantages"

It is so small and compact that it can be fitted snugly against the engine and makes a very neat installation. It lends itself to simple driving arrangements and can be mounted either horizontally or vertically. The position does not affect lubrication, because the pump runs in filtered fuel oil under a slight pressure and no special lubrication is needed. It is suitable for high speed work, because its rotating parts are light and there are no highly loaded springs. There is much more besides . . .

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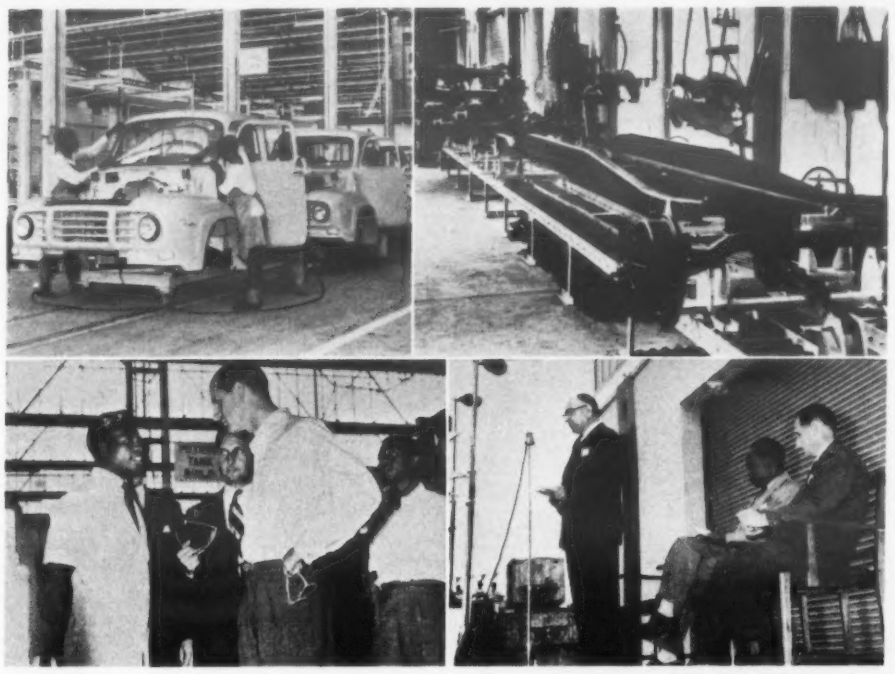
BEDFORD ASSEMBLY IN AFRICA

Nigerian and Ghanaian Plants

DURING 1959 two notable events took place in West Africa, with the opening of vehicle assembly plants both in Nigeria and Ghana. The vehicle assembly plant of the United Africa Company of Nigeria, Limited, was officially opened at Apapa, Nigeria, on June 6 by the Hon. Zana Bukar Dipcharima, Federal Minister of Commerce and Industry. The plant—first of its kind in the West African region—is producing eight vehicles a day in the initial stages and it is planned that this production will gradually increase. At present production is limited to the types of trucks made for which there is the biggest demand, but the full range of Bedford trucks could be assembled with the same plant.

It was designed and laid out by Vauxhall and



Bedford cab assembly at the United Africa Company's plant at Tema, Ghana; right, chassis riveting in the Nigerian plant at Apapa. Below, during the Duke of Edinburgh's tour of the Tema plant he talked with G. O. Fiaxo, one of the four Ghanaian foremen; right, Sir Patrick Fitz-Gerald, chairman of the United Africa Company of Ghana, Limited, welcomes the Prime Minister, Dr. Kwame Nkrumah, when he formally opened the plant last December—its commercial manager, Mr. J. D. Wood, it on the right

General Motors planning engineers, and cost £310,000. Key men from Nigeria spent nine months getting first hand experience of Bedford assembly and cab building techniques in the Vauxhall factories at Luton and Dunstable. The Apapa plant manufactures cabs complete from sheet-metal components made at Luton and shipped to Nigeria in c.k.d. form. The operations carried out at Apapa include cab weld, cab metal-finish, cab paint and trim. Chassis frames are riveted and assembled by the cold-squeeze riveting process. Units are built up on a hand-push assembly line. The plant consists of three buildings. The assembly building is in the centre and is flanked by the parts warehouse on one side and receiving store for boxed c.k.d. units on the other.

Work in Ghana

The vehicle assembly plant of the United Africa Company of Ghana was opened by Dr. Kwame Nkrumah, the Prime Minister of Ghana, at Tema on December 4. The plant, which cost £250,000 and covers an area of 35,000 sq. ft., will produce some 60 vehicles a month. The staff will number 80, among whom are four Ghanaian foremen who spent nine months under training at the factory of Vauxhall Motors in the United Kingdom.

Speaking at the opening, the Prime Minister said: "This ceremony, like others that we shall be performing in the coming months, is of great moment because it heralds the birth of new industry. The more functions of this kind that take place in Ghana the clearer is the indication that we are making progress towards the industrialisation of our country.

"In our Second Development Plan, which involves an expenditure of £350 million, our industrial programme falls into three categories: those industries which Government alone must undertake, those that can be undertaken in a joint venture by Government and private investment, and those that can be undertaken by foreign investment alone. It will be obvious to you, therefore, why the Government of Ghana is doing all it can to create in this country conditions that will attract foreign investment."

Speaking of the training that had been given to the Ghanaian foremen in the United Kingdom, the Prime Minister said he hoped such opportunities would be given to many more Ghanaians. After the official opening, a Bedford vehicle, one of the first to be assembled in the plant, was presented to the Prime Minister for the Builder's Brigade as part of the company's contribution to the five-year development plan.

The plant was also visited by the Duke of Edinburgh on his recent tour of Ghana. He spent a quarter of an hour going round the factory accompanied by the commercial manager, Mr. J. D. Wood. He took a keen interest in the many stages of assembly and the Ghanaian foremen were presented to him. The vehicles are assembled from some 2,500 component parts shipped from the Vauxhall factories at Luton and Dunstable. The method of assembly is an interesting introduction to Ghana, and requires Ghanaians to acquire new techniques including spot welding. The whole plant and assembly operation takes place in a large Arcon building which has been constructed to allow a screen of unbroken light to illuminate the length of the plant without the sun's rays ever bearing directly into the works.

Big Buses in Johannesburg

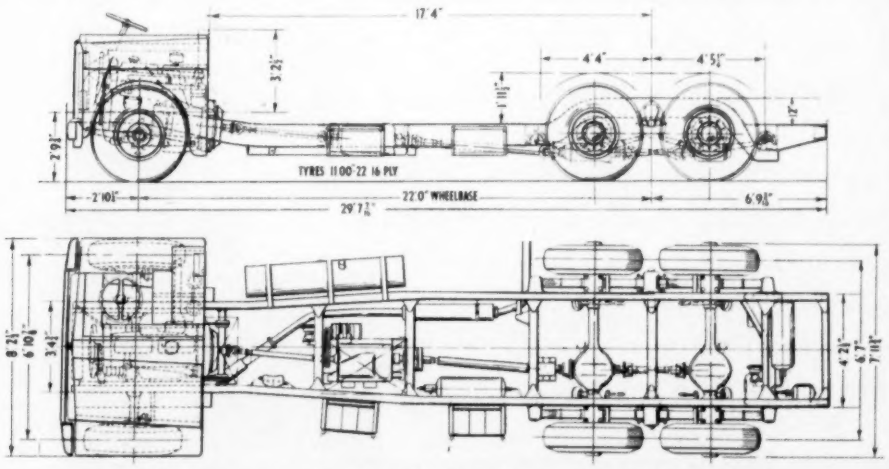
(Continued from page 23)

well as reducing the excessive travel of the lever which is normally associated with an orthodox single-pull control, can also be released gradually, or instantaneously, as desired. The handbrake operates mechanically on the rear wheels only, on the same shoes as the footbrake.

Steering and Suspension

Cam and double roller steering has a ratio of 28.5 to 1. Bendix-Westinghouse power-assisted steering can be fitted to this Guy chassis. The road springs are laminated semi-elliptics of silico-manganese steel. Those at the front are 5 in. wide and carried at 50 in. centres; the rear sets are 4 in. wide and have 48¾ in. centres. An anti-roll device on each gives a stable ride and rubber overload buffers are provided. Newton telescopic hydraulic dampers are incorporated in the suspension.

The frames are $\frac{9}{32}$ in. high tensile steel channel section pressings, braced with five pressed steel channel and two tubular cross-members. The frame ends at the rear bogie, the body having a self-supporting rear end. Chassis lubrication is by a 24-point Clayton Dewandre RP type unit, operated by compressed air from the brake circuit. Connections to lubricating points are by high-pressure nylon tubing. The tyres are 1100 by 22 16-ply on interchangeable wheels. A Simms magnetic type leak-proof fuel gauge is fitted. The 24-volt insulated return electrical system is provided by C.A.V. The 232 amp. hr. lead acid battery of this notable bus is carried in four 6-volt units. The appearance of the vehicle is enhanced by the radiator cowling and a substantial front bumper.



General arrangement of the Guy six-wheel chassis with Rolls-Royce engine

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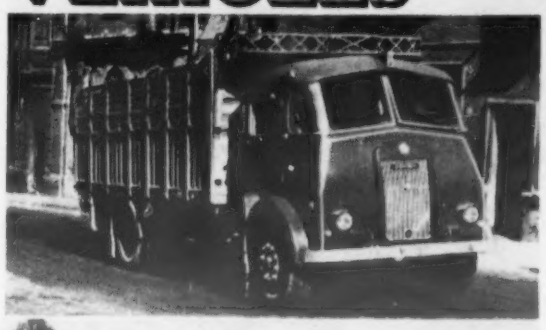

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Inner thoughts on the Outer Seven

The coming of the Outer Seven free trade area suggests further development for export business. As the tariffs start tumbling, the surge will be on . . . more deals, more flying visits, more contracts, a faster flow from Britain to six countries in Europe.

With your expansion into these eager markets you will be glad to rely on the National Provincial Bank which has long since built a strong and friendly connection in these very countries through its correspondents.

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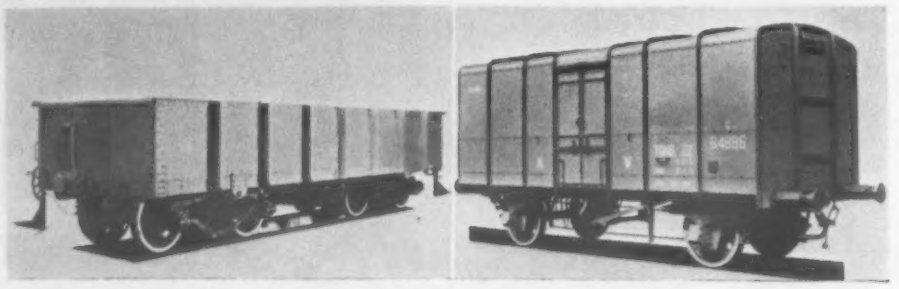
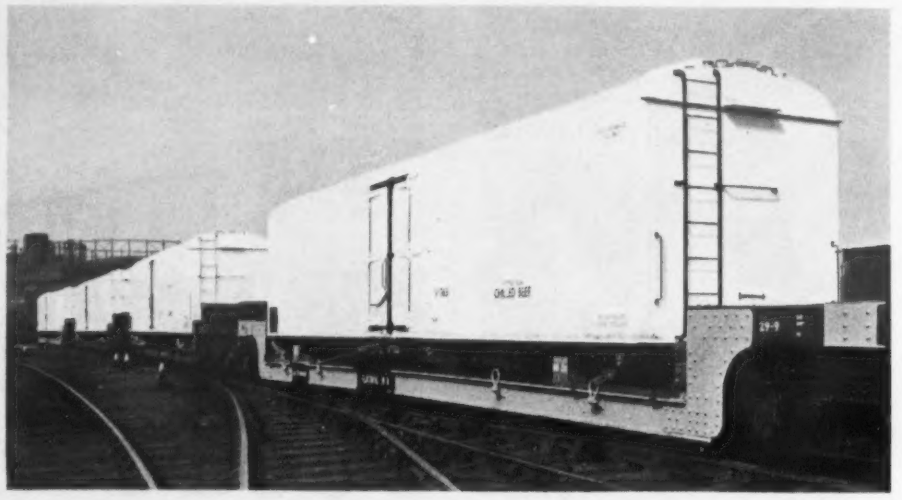
RECENT EXPORT ACHIEVEMENTS

By Metropolitan-Cammell

IN spite of intense competition Metropolitan-Cammell Carriage and Wagon Co., Limited, has continued to obtain substantial contracts for the supply of rolling stock to railways throughout the world. In 1959 another 10 export contracts were completed, covering a wide variety of wagons.



Contrasting Metropolitan-Cammell products: a 3 ft. 6 in. gauge 30-ton bogie ore wagon for the North West Guiana project of African Manganese Co. (Mines Management), Limited (tare 12 tons 18 cwt.; length 26 ft. over headstocks; consulting engineers, Livesey and Henderson) and, right, four-wheeled 22-ton 5 ft. 6 in. gauge covered van (tare 10 tons 4 cwt.; length of underframe 23 ft. 6 in.; width inside body 9 ft. 8 in. and height inside 8 ft. 0½ in.) for North Western Railway of Pakistan



A consignment of refrigerated wagon bodies and underframes for New Zealand (3 ft. 6 in. gauge) leaving the works of Metropolitan-Cammell Carriage and Wagon Co., Limited

Metro-Cammell has become the main supplier of wagons to Sudan Railways and last year completed a contract for 850 bogie covered wagons for the Sudan—this being the fourth repeat order for this type of wagon. Also on the African continent, orders for 500 bogie highsided and 200 covered goods wagons were fulfilled for Rhodesia Railways.

Two types of bogie wagons were supplied in 1959 to the Benguela Railway in Portuguese West Africa. These orders were for 60 dropsided and 50 covered goods wagons, and towards the end of the year a contract for 75 35-ton bogie lowsided wagons was completed for Nigeria. Some special flat wagons are now being delivered for a mole-building project in the area of the Escravos Bar in Nigeria. With the award recently of an order for four-wheeled cattle wagons for East African Railways, Metro-Cammell has in the last 12 months been exporting wagons to five different countries in Africa.

The African Manganese Company in British Guiana last year took delivery of the last consign-

(*Continued in next column*)

NARROW-GAUGE ENGINES FOR SOUTH AFRICA

(*Continued from page 6*)

Limpet asbestos mattresses. Wakefield's 7Z lubricators are used, one being located at the outer end of each unit. The delivery feed piping is now of steel instead of copper. Aeroquip hoses have been extensively used. A lubricator-charging reservoir, with a capacity of 15 gallons, has been added on the outer end of each unit.

The braking system has been considerably modified. In place of the one 18-in. diameter vacuum cylinder previously located between the frames of the boiler unit, and the steam cylinder mounted on the hind unit frame to operate the rigging on that unit, two 21-in. diameter vacuum cylinders are now provided. These are fitted between the boiler unit frames and are connected to separate brake shafts for the front and hind engine units. A Gresham and Craven S.S.J. Type G ejector, with 2-in. separate driver's brake valve, is now used.

FORTHCOMING EVENTS

Mar. 21.—I.R.T.E. (East Regional). John F. Moon, "Road Testing Commercial Vehicles." Council Chamber, Houldsworth Hall, 90 Deansgate, Manchester. 7.30 p.m.

Mar. 22.—Inst.T. (N.W.). Annual general meeting and films. Gas Service Centre, Mount Street, Manchester 2. 6.15 p.m.
Inst.T. (Humberside). Informal dinner and films. George Hotel, Whitefriargate, Hull. 7 p.m. for 7.30 p.m.
Inst.T. (Yorks). L. Holmes, "Claims." Leeds City Transport Department, 1 Swinegate, Leeds 1. 7 p.m.
I.C.E. R. Beeching, James Forest Lecture: "Plastics in Engineering." Great George Street, S.W.1. 5.30 p.m.
R.Nav.A. Annual dinner. Grosvenor House, Park Lane, W.1. 7 for 7.30 p.m.

Mar. 22-24.—R.Nav.A. Spring meeting at 10 Upper Belgrave Street, S.W.1.

Mar. 23.—S.R.L.D.S. Annual general meeting and prize essay. Chapter House, St. Thomas' Street, S.E.1. 6 p.m.
Rly.S.A. F. C. Margetts, "Wagons—their use and misuse." London School of Economics, Houghton Street, W.C.2. 6.15 p.m.
O.S. Visit to Sheffield United Tours Limited.

Mar. 24.—R.Ae.S. Dr. R. B. Jamison and R. J. Lane, "Engines for Supersonic Air Liners." I.Mech.E., 1 Birdcage Walk, S.W.1. 6 p.m.

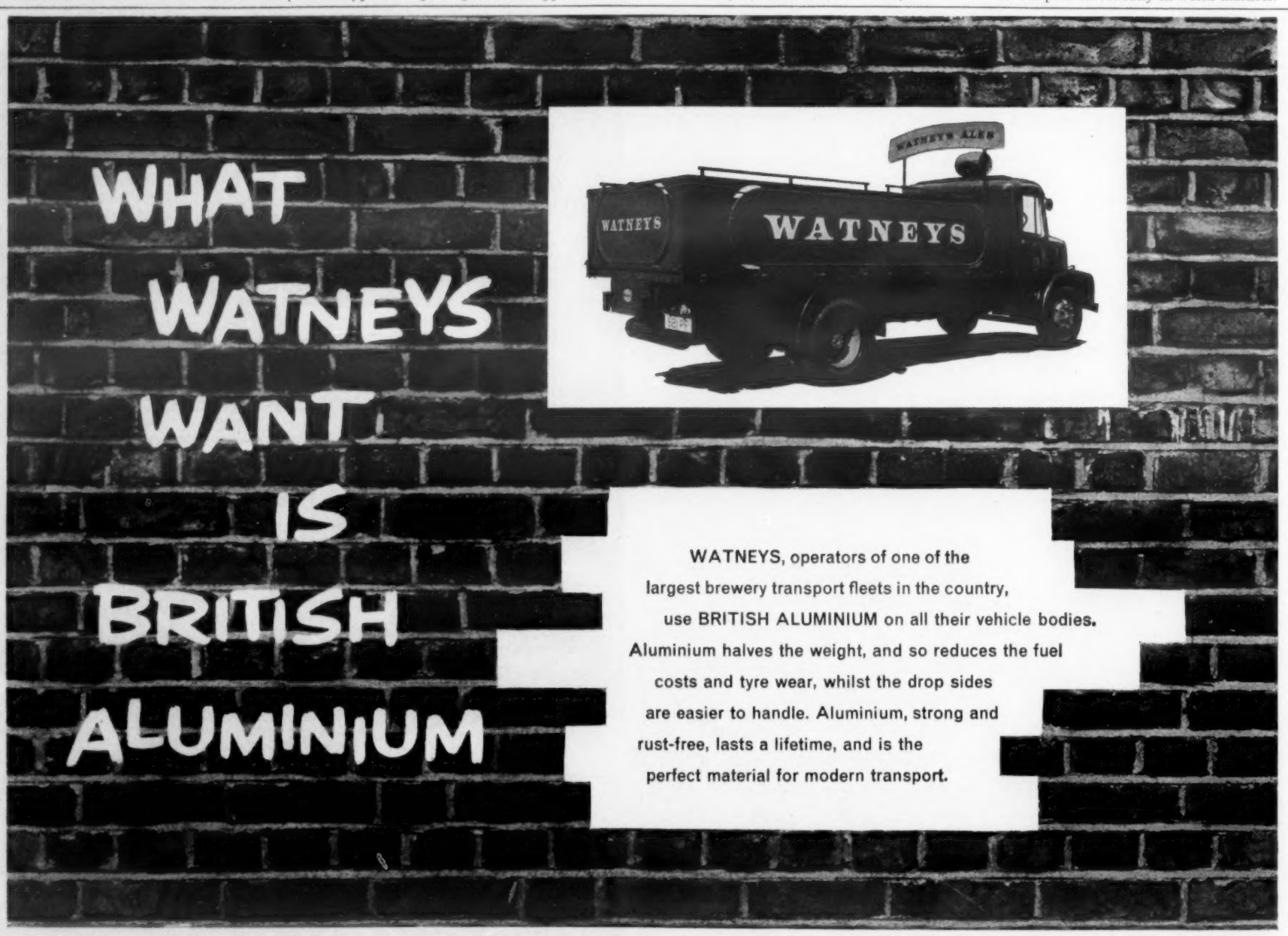
Mar. 25.—R.Ae.S. (Man-Powered Aircraft Group). D. Perkins, "Aerodynamics of Man-Powered Flight." 4 Hamilton Place, W.1. 7 p.m.
B.I.R.E. (Scottish). J. Shayler, "Radio Guidance in the Automatic Landing of Aircraft." Department of Natural Philosophy, The University, Drummond Street, Edinburgh. 7 p.m.

Mar. 26.—L.R.T.L. V. E. Burrows, "London File, 1931." 153 Drummond Street, N.W.1. 6.30 p.m.
Rly.S.A. Visit to Brush Electrical Engineering Works, Loughborough.

(*Continued from previous column*)

ments of contracts for 50 30-ton bogie ore wagons as well as bogie tank wagons and stores vans. One of the largest export orders for wagons received in recent years was from Pakistan. In October last the final shipment was made of an order for 1,365 four-wheeled covered CR type wagons.

Among the many types of special-purpose wagons built by Metro-Cammell are refrigerated wagons, and a contract for 100 of these was last year completed for the railways of New Zealand. Thus, with the completion, also last year, of 349 electric suburban coaches for South African Railways, and with the current contracts for passenger brake vans for Rhodesia Railways and second class coaches for East African Railways, Metro-Cammell continues to compete successfully in world markets.



WATNEYS, operators of one of the largest brewery transport fleets in the country, use BRITISH ALUMINIUM on all their vehicle bodies. Aluminium halves the weight, and so reduces the fuel costs and tyre wear, whilst the drop sides are easier to handle. Aluminium, strong and rust-free, lasts a lifetime, and is the perfect material for modern transport.

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AP397

ONE HUNDRED YEARS OF RAILWAYS IN SOUTH AFRICA

S.A.R. Prepares to Celebrate

By D. H. C. du PLESSIS, M.Inst.T., General Manager, South African Railways, Harbours and Airways

THE end of a hundred years of railways in South Africa will coincide very nearly with the end of the biggest programme of modernisation and improvement ever carried out in Southern Africa in connection with transport. The programme commenced shortly after the end of the 1939-45 war, and when completed towards the end of 1961 will have cost the Administration approximately £700 million.

The first railways started in Southern Africa, both from the Cape Town as well as the Durban end, were modest in conception. The wealth of South Africa which during the course of a hundred years brought publicity in so rich a measure and which served to promote world interest was still hidden in the interior. Kimberley became a world synonym for diamonds 30 years after the construction of the first railway was started, while coal and gold were discovered much later.

Mineral Wealth

If it is true, as it is often contended, that the first railway projects were inspired by the success in Europe of the railway as a means of transport, it is true to an even greater degree that the spark for the remarkable development of the railways was supplied by the country's unparalleled mineral wealth. Today, the South African Railways is the largest network in the whole continent of Africa.

It operates over a route-mileage of 13,458; it carries about 290 million passengers a year and 80 million tons of goods, while the country is criss-crossed from east to west and from north to south with railway lines. The South African Railways has 2,740 steam, 459 electric and 60 diesel locomotives in service and orders have been placed for additional electric units and diesel-electric locomotives. The system also has 106,746 goods vehicles and more than 6,000 passenger vehicles.

Progress during the first hundred years has been almost uninterrupted. Road transport services were started in 1912 and, in 1934, South African Airways was brought into the transport network. The harbours of South Africa have always been part and parcel of the railway organisation and today the term South African Railways is used in an inclusive sense to cover railways, harbours, road transport and airways. The organisation is controlled by the State and it is national in every sense of the term. The capital invested in all these transport undertakings amounted at the end of March, 1960, to approximately £678 million, while revenue is nearly £200 million a year.

The position in which the South African Railway Administration finds itself in relation to transport demands has been achieved in a comparatively short space of time. Plans had of necessity to be on the generous side as the South African economy in the field of mining, industry, commerce and of agriculture has shown no real signs of flattening out. Special attention has been devoted to goods-handling facilities, to mechanisation, to the improvement of track capacity and the replacement of worn-out assets. Positive results are to be seen in faster rail services and greatly increased carrying capacity. Steam, backbone of tractive effort for a hundred years, is being superseded to a considerable extent by electrification on a major scale and by the introduction of diesel traction in certain sectors, notably South West Africa.

Modernisation

The modernisation plan is now nearing its final stages and enough has been done to place the national transport system on terms with demands. What remains to be done apart from the few major projects still to be completed will consist of the addition of some necessary refinements, of negotiating the difficult transition stage of teething troubles and unavoidable delays and of bringing new works and new assets into productive service as soon as possible. Such projects as the introduction of centralised traffic control on a large scale, the completion of electrification plans, the further improvement of the harbours, the extension of mechanised handling at the ports, the mechanisation of the main marshalling yards and track maintenance, the necessary development of communications for use in connection with improved methods of operating control and the further increase of diesel traction are still under way or are in the process of being introduced.

The modernisation plan has been an expensive process. Expenditure from capital and betterment funds amounted to £68,850,453 during 1957-58, to £79,135,428 during 1958-59 and to £72,574,000 during 1959-60, bringing the total to £220,359,881 in a period of three years.

While South Africa may not for many years, if ever, be able to eliminate steam traction, the steam locomotive is gradually but significantly disappearing from many main lines. The first diesel-electric locomotives (45) ordered by the South African Railways have been in service for some time and have performed very well. They have been used for heavy haulage chiefly from the coalmines of the Transvaal and also on some main-line passenger trains. The seven diesel-hydraulic locomotives ordered from Henschel, Germany, at a cost of £67,950 each, have arrived and are in service. Their performance is being carefully studied.

Dieselisation in South West Africa

The next step was the introduction of diesels in South West Africa. For this purpose 115 diesel-electric locomotives at a cost of approximately £11 million are now in process of being delivered. The complete dieselisation of South West Africa has been planned to coincide with the conversion of the narrow-gauge (2 ft.) railway lines in the northern areas, a project which is expected to cost more than £6 million. Diesel operation in South West Africa was dictated by the scarcity of water and recurring droughts and to eliminate the cost of transporting coal for locomotive purposes from the Transvaal, a matter of nearly 2,000 miles.

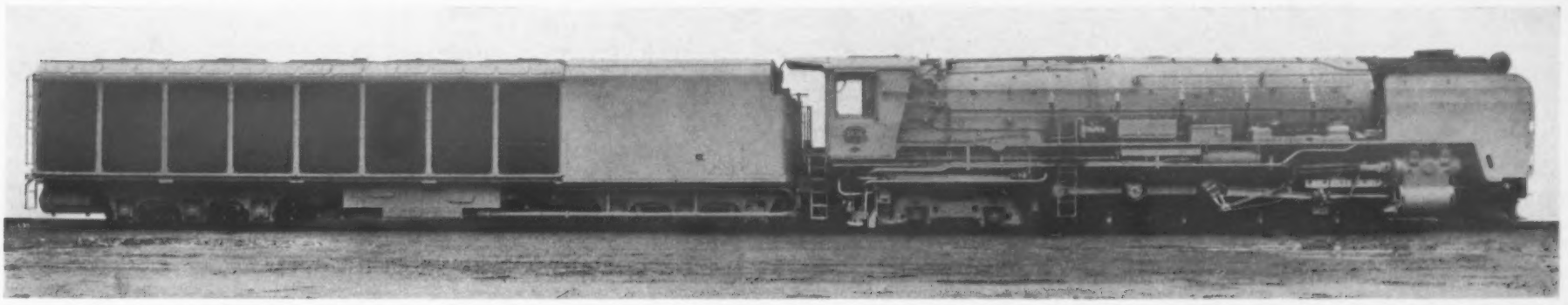
Electric working on the South African Railways dates back as far as 1926, when the Pietermaritzburg—Glencoe section of the Natal main line was electrified at a cost of £4,500,000. At the end of the 1953-54 financial year 859 route-miles representing 1,748 single-track-miles had been electrified. During the next five years a further 267 track-miles were added, bringing the total mileage of electrified track at the end of March, 1958, to 2,015 or 11.4 per cent of the total mileage of railways, while the total track mileage on completion of the present electrification programme will be 2,980.

Expenditure on electrification of railways during the past five years amounted to about £23 million, while the expenditure of £6,500,000 was approved for the financial year ending March, 1960. The electric working of trains will then be possible from Cape Town to Beaufort West (339 miles), Durban to Volksrust (321) and Harrismith (263), Witbank to Klerksdorp (200) and from Pretoria to Kroonstad (160 miles). Delivery has just started of the 135 class 5E1 electric locomotives ordered from Metropolitan-Vickers of the United Kingdom at a cost of £7,643,804. These 2,100-h.p. locomotives will be used in Natal and the Cape.

New Lines and Multiplication

The construction of new railway lines and the doubling of some existing lines have formed a major item on the railway programme during the past five years. At the close of the financial year ended March 31, 1954, the total track mileage was 14,025, which was made up of 12,872 miles of single track, 498 miles of double track, 15 miles of triple track, 22 miles of quadruple track and four miles of quintuple track. During the ensuing four years a total of 311 track-miles were added, bringing the total track mileage at the end of the 1958 financial year to 14,336 miles. Expenditure during the past five years on new railway construction amounted to £34 million. When the construction programme approved by Parliament is completed the total track mileage will be 18,554.

(To be continued)



One of the South African Railways Class 25 4-8-4 condensing locomotives (by North British Locomotive Company with Henschel condensing tender) for crossing the Karroo, where good feed-water is scarce; the work of these engines between 1953 and today was described in a paper before the Institution of Locomotive Engineers by Professor Dr. Ing. R. Roosen on March 15

Cost Study Applications

C.P.R. EVIDENCE TO COMMISSION

PRESENTATION to the Royal Commission on Rail Transportation sitting in Ottawa of evidence on behalf of the two great Canadian railway undertakings has already been the subject of editorial comment in our columns (January 16) when particular reference was made to the evolution of grain rates and their justification. In the preparation of its case the Canadian Pacific Railway naturally had recourse to cost study and its results were set out in a memorandum which was among those submitted to the Royal Commission.

The submission recorded that cost analysis had in fact been used by the C.P.R. for many years and that many studies had been used by traffic officers in making just and reasonable rates. Grain and its products in Western Canada constitute a large portion of the volume of traffic moved and because of their influence upon much of the plant and many operations, the problems involved in costing this portion of the traffic were less than would otherwise be the case. It was also pointed out that the extent of the company's operations over widely different geographical areas with different operating and investment characteristics made it possible to obtain a cross-section of railway costs under uniform maintenance practices. This was in contrast to the United States, where circumstances required cost studies to be based on a number of different railway systems.

Milling Points

Revenue data for grain moving direct to export positions at Fort William and Vancouver was readily available by stations of origin for the year 1958 from the company records. Consequently, it was not necessary to take a sample in order to arrive at total revenues for this traffic. In the case of revenues for grain and grain products being moved under the stop-off privilege, two separate waybills are prepared—one for grain moving into a mill and the other for grain products moving out of a mill. It was, therefore, necessary to develop revenues by stations of origin for grain moving to milling points and grain products moving from milling points. This was done for the full year 1958. Basic information was extracted at milling points from local records.

On Canadian Pacific these points are Keewatin, Winnipeg, Moose Jaw, Saskatoon, Medicine Hat, Lethbridge and Calgary. There is no distinction made on the original waybill of grain moving to a mill as to whether the movement is for export or for domestic purposes. However, if products are to move to export positions the statutory and related rates apply from the origin to the export positions plus a stop-off charge at the mill. The waybill covering the shipment of the products out of the mill must have on it the origin station of inbound grain. As a result, it was necessary to analyse all waybills covering shipments from a mill in order to arrive at the station of origin of the original shipment of grain. The preponderance of grain moving to a mill does so at the statutory or related rate; occasionally the local mileage rate is used and when this occurs the traffic is re-rated at the statutory level.

The analysis showed the revenue accruing from the movement of grain inbound to the mills and grain products outbound from the mills. The revenue from statutory grain moving direct to the Lakehead during 1958 amounted to $20,005,214. The revenue from grain moving direct to the Pacific Coast ports for export during 1958 amounted to $12,058,369.

Total Revenue

The revenue from grain and grain products in 1958 moving under the stop-off privilege to the Lakehead amounted to $2,634,968 and to the Pacific Coast ports amounted to $909,215. The total revenue applicable to the study traffic for 1958 at year end rates was $35,607,766.

As with revenues, the company's records show the tons and numbers of cars of grain and grain products originating by station. For these figures also, it was necessary to trace moves of milling-in-transit traffic. Revenues, cars and tons were all obtained from the actual waybills. A routeing pattern for the movement of cars of grain from each station was established by field studies. This enabled the route miles to be developed by railway subdivisions for the loaded movement from each station of origin to each station of destination. The multiplication of tons and the route miles from each origin station provided revenue ton-miles from each station and the number of loaded cars times the route miles from each origin station provided loaded car-miles from each station. The revenue ton-miles and loaded car-miles figures were thus developed for each subdivision.

Loaded Movement

Gross ton-miles for the loaded movement were then developed. Gross ton-miles include not only the content ton-miles but also the ton-miles for the tare weight of the car. The tare weight of box cars used in grain service was obtained by special study. This study showed that the average tare weight of box cars was 23 tons. The study was based on a sample of over 3,700 box cars used in grain service in 1958. The tare weight multiplied by the loaded car-miles gives tare ton-miles. Tare ton-miles added to revenue ton-miles gives gross ton-miles for the loaded movement.

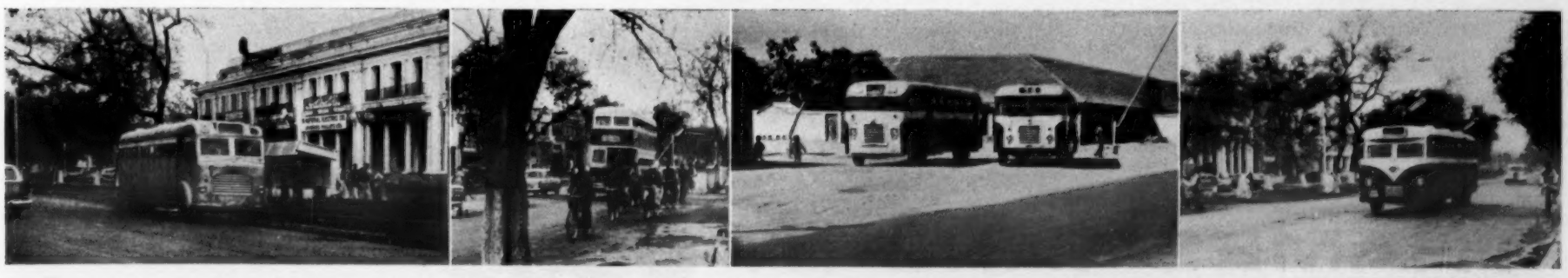
The number of carloads of the study traffic was determined from the waybills. The number of loaded cars passing through each terminal on the Prairie and Pacific Regions was developed from the routing of the traffic. This gives loaded car handlings at each terminal.

The empty car movement attributable to the 1958 grain traffic was developed from a sample of prior empty movement of over 3,700 cars. Prior empty mileage on this sample east of Fort William was excluded. The volume of grain traffic made it possible to trace from company records the movement of empty cars used for handling grain. Ordinarily cost studies are based on a proration of empty car-miles to loaded car-miles. However, in the present study, by actually tracing empty car movements for the study traffic a more precise method is being used.

Tracing Empty Car-Miles

The tracing of empty car-miles was by subdivision by direction of movement. Based on the 3,700 car sample, total empty car-miles were similarly obtained. Gross ton-miles empty were obtained by multiplying empty car-miles by the tare weight of 23 tons developed from the sample referred to earlier. From the sample total gross ton-miles—empty, empty car-miles and empty car handlings were obtained. Active car days for the loaded and empty movement for the study traffic were taken from the sample of 3,700 box cars. Active car days represent all the time the cars were under load plus the time of the related prior empty movement. All storage and repair times were excluded from active car days. From the sample, total active car days for the total study traffic were obtained.

Basic statistics kept by Canadian Pacific show train miles, locomotive miles, gross ton-miles, fuel and crew wages, and net ton-miles for each train-run operated. The statistics are available by direction. From these basic statistics, the relevant data for the study traffic was developed. The train-miles attributable to the study traffic were developed by determining the proportion, on a gross ton-mile basis for the train-runs on which grain was handled, that the study traffic was of total gross ton-miles on these train-runs. An adjustment factor was introduced to reflect the resistance characteristics of heavily loaded traffic such as grain in relation to more lightly loading commodities. Constructive train-miles used to handle the study traffic were developed based on the average weight of trains on which the study traffic moved weighted by the proportion of the study traffic to total traffic on each train-run. Locomotive-miles were developed from the addition of train-miles and train-switching-miles of the study traffic. Submissions to the Royal Commission were thus very adequately supported.



Bus operating scenes taken in Pakistan by "Modern Transport" on March 8 and 9. Left, left centre and right show a Leyland Comet, Guy Arab, and Leyland Royal Tiger of the West Pakistan Road Transport Board on local services at Lahore; right centre, Bedfords maintaining the frequent service between Karachi and the civil airport

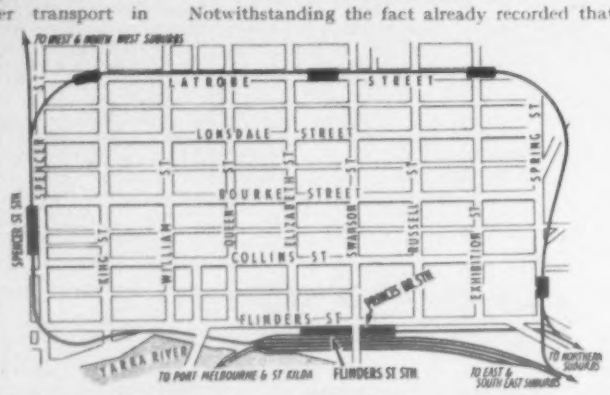
Transport Around Melbourne

(Continued from page 15)

with all of the foregoing, the Board joins with other interested authorities in directing attention to the urgent need for, and the marked advantages to be obtained in a community sense as well as for the individual peak-hour traveller from, a well-designed scheme for staggering of working hours.

Better Liaison Urged

Questions of public passenger transport in metropolitan Melbourne are matters of concern in one aspect or another to quite a number of existing public authorities, e.g. Railways Commissioners, Tramways Board, Traffic Commission, Co-ordinator of Transport, municipal authorities and, particularly, the Melbourne City Council and the town planning section of the Melbourne and Metropolitan Board of Works, as well as the Board, and there seems to be a need to develop some standing arrangement under which the concerns of the various bodies can be brought together from time to time. It is thought that a deliberate integration of overall planning and forward thinking by these bodies could well be brought into being as required. Particularly in association with questions of industrial and housing projects, etc., it is thought that it would be appropriate for this to be initiated by the Melbourne and Metropolitan Board of Works. The Board's prime function in this sphere is to adjudicate in conflicts which arise from time to time between rail, tramway and private bus interests, and between private bus operators themselves. Comparable conflict also arises from time to time in association with the development of new services in the rapidly expanding outer suburban areas, some of which are away from present railway facilities. Under all existing conditions it is, moreover, necessary, in effect, to adjudicate between the operator and the community he serves concerning the standard and frequency of service he can be expected to provide on the revenues he is earning.



Proposed underground terminal loop for Melbourne suburban trains

Limit to Further Electrification

Notwithstanding the fact already recorded that existing private bus services in the Melbourne metropolitan area under licence by the Board are suffering from loss of traffic and thus reducing revenues, there is still a more or less normal readiness by suitable applicants to undertake developmental services in the new outer areas. Contemplating public passenger transport in metropolitan Melbourne and relevant conditions and experience under comparable conditions in other countries, and United States of America particularly, there are, in the Board's view, grounds for thinking that there will not be any major extension of surburban electric railway services beyond those already in progress or approved.

At the same time, the existing rail network with undergrounding as already planned should be regarded as the central kernel of metropolitan public passenger facilities. Everything should be done to draw off on to this system as many passengers as can possibly be encouraged to use it as an alternative to the private car. The existing network of services provided by the Melbourne and Metropolitan Tramways Board lies mainly within the inner built-up area of declining population. It is believed that it will become a function of the Tramways Board to develop certain subsidiary arterial services from newer, outer residential areas now developing and to be developed in the future. This, as we see it, will be done with the bus, a more flexible unit to operate alongside and, in effect, in competition with the private car. Bus services of the kind would be expected to come into being to serve new areas where the existing suburban railway system does not effectively tap the traffic. In some instances, this could cause conflict with existing private bus services already being developed.

(To be continued)

RADAR TOURS EUROPE

(Continued from page 7)

reduce eye-strain; automatic alignment between the slotted waveguide aerial and the display, which detects and corrects azimuth error or alerts the operator if an azimuth error persists; fixed range rings, variable range marker, mechanical bearing cursor and electronic bearing marker available on all range scales; and comprehensive monitoring systems. The monitors give automatic warning of error in azimuth stabilisation; of faulty regulation of main radar voltage; when receiver gain is not set at maximum; when the differentiator is in circuit; and when the local oscillator is off tune.

There is no doubt that the Escort equipment removes many of the possibilities of human error in the use of radar for navigation in congested waters; it also greatly facilitates the training of ships' officers in radar operation.

THE CHANNEL TUNNEL

(Continued from page 3)

carrying trains referred to earlier. These trains would shuttle between the portal stations. Each of these stations would have a special loop line round which the car-carrying trains would run, so that they came to a stand facing the tunnel, and ready to proceed through it again as soon as the cars on the train had been driven off at one end and other cars had driven on at the other. Unloading and loading would take place as nearly as possible simultaneously.

The proposed dimensions of the tunnel would, however, make it possible to build double-deck car-carrying trains, with the upper deck 5 ft. 7 in. above the lower deck, which would be ample clearance for all modern motor-cars.

The tunnel dimensions would allow loaded lorries with an overall height of up to 12 ft. 6 in. to go through on low-loading rail trucks. Such vehicles would have to be loaded end-on, over buffers. Smaller lorries and coaches could probably be loaded with cars on single-deck car-carrying trains.

Operation a Joint Responsibility

It is proposed that the operation of the Channel Tunnel, like everything connected with it, would be a joint responsibility shared as equally as possible between the S.N.C.F. and British Railways. This is not quite as simple as it sounds. French signalling aspects differ somewhat from the British. A *via media* would have to be found, since one could hardly change aspects in the middle of the tunnel.

For physical reasons, the French portal station could be sited much nearer the tunnel mouth than could the British portal station, so that the mid-point in the under-sea section would not be the mid-point between the portal stations. The S.N.C.F. will have available a number of 25 kV 50 cycle locomotives, whereas in Britain the Southern Region will be operating on 750 volts direct current. This means that locomotives hauling non-stop expresses between London and Paris would have to be poly-current machines.

There is no doubt that the actual working and control of operation in a 32-mile tunnel, in which there might be up to six trains moving fast in one direction at one time, would call for the closest kind of co-operation between the railway authorities at either end. Evidence that this would be no difficulty is already on record in the remarkable degree of harmony that has marked two years of planning and discussion between French and British Railways.

Timings

The basic timings would probably be those of the car-carrying trains at 15-minute intervals, running at an average scheduled speed of 60 m.p.h. In between them would be fitted the London—Paris non-stop expresses doing the whole journey in 4 hr. 20 min. and averaging 70 m.p.h. through the tunnel; other non-stop expresses; expresses made up of Continental stock; a few car-sleeper trains of "ferry" gauge stock carrying passengers and their cars, say, from Birmingham to Nice; and freight trains and lorry-carrying trains.

The tunnel would be signalled to allow trains moving at equal speed to follow each other at 3-min. intervals; but in practice the minimum interval would probably be 5 min., which over 18 hr. (allowing 6 hr. for maintenance) gives a theoretical capacity of 216 trains per day in each direction. In practice, a capacity substantially lower may be expected; but even 110 trains per day in each direction would handsomely cover expected requirements in 1980 when on the traffic forecast supplied by the Study Units a total of 90 trains a day would cope with the traffic offering.

Prospects

Economic prospects of the scheme are reasonable. First, air transport has made little impression on the freight side. Cost per ton is so much above surface rates that only exceptional traffic goes by air. Second, air transport carries motor cars at the most in half dozens; trains could carry them —quite fast—in hundreds. But for passengers, air transport has obvious advantages over distances exceeding, say, 250 miles, and this has been allowed for in the study unit estimates. Up to that distance, the time taken to travel from city centres to airports added to airport terminal time would make surface routes generally competitive; and it is thought that a non-stop hourly service between London and Paris with comfortable trains and good catering, doing the journey in 4 hr. 20 min., would hold its own against any air competition, even helicopters. Moreover, it is worth remembering that the tunnel will always be open for traffic, particularly when other means of crossing the Channel are held up by fog or storms.

From a wider viewpoint, there is no doubt that a Channel Tunnel would be a major step forward in the history of both French and British Railways. The fast through services, both passenger and freight, which the tunnel would make possible, would encourage the rail conveyance of long-distance traffic which today often adds unnecessarily to the congestion on roads.

Community's Interest

This is not a partisan point. From the point of view of the community, there is obvious sense in not using a means of transport which requires one or even two men for each vehicle load when there is available another means by which three men can look after a thousand tons. Train ferries have been valuable, but inevitably they are expensive in the time and energy required to move wagons on and off.

Road traffic, as has been shown, would be amply provided for, and would be taken through on trains more safely and speedily than it could hope to move through a 30-mile tunnel under its own power.

Transport of any kind is, however, chiefly a means to an end. The Channel Tunnel could be a means to a very great end—the unity of Western Europe. Twenty miles of sea have separated Britain from Europe down the centuries in more senses than the physical. There have been times, as in 1940, when we have been profoundly grateful for those twenty miles. But today nuclear weapons have made them unimportant in military strategy, and ideological attack has intensified the need for free peoples to unite. When those twenty miles can be traversed by motorists more quickly than the twenty miles from, say, Ealing through London to Tilbury; when passengers can step into a train in Victoria Station and step out again some four hours later in the Gare du Nord; when a family can board a train with their car in Birmingham and leave it at Nice; then the British will begin to know Europe in a new way, and to feel part of it as never before.

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SOCIAL AND PERSONAL

Chairmen of B.T.C. Area Boards

CHANGES in the chairmanship of the London Midland and Eastern area boards of the British Transport Commission which were heralded in an announcement in January will come into effect from March 15, i.e., Lord Rusholme to relinquish the chairmanship of the London Midland area board but to remain a member of the board; Sir Reginald Wilson to be chairman of the London Midland area board and to relinquish the chairmanship of the Eastern area board; and Major-General G. N. Russell to be chairman of the Eastern area board and to cease to be a member of the London Midland area board.

* * *

Mr. T. J. Stammers, M.M., M.Inst.T., until recently divisional engineer (Central Road Services), North West Division, London Transport, is retiring today (March 19). Mr. Stammers was awarded the Military Medal and mentioned in dispatches during the 1914-18 war. On demobilisation, he completed his training as an engineer and joined the staff of a heavy haulage contractor. In 1924 he was appointed to the staff of the National Omnibus and Transport Company in the Home Counties, and in 1929 was made a depot engineer. With the transfer to London General Country Services in 1932, Mr. Stammers was promoted to district engineer and became responsible for bus and Green Line coach garages in Essex and part of Hertfordshire, continuing in this capacity, with additional responsibilities, on the formation in 1933 of the London Passenger Transport Board. In 1937 he was appointed assistant divisional engineer, north division of the Country area. He became divisional engineer (rolling stock) (buses and coaches), C Division, in the Central area in 1947 and was made an officer of London Transport Executive in 1948. In 1950 he was restyled divisional engineer (Central Road Services), North West Division, on the formation of a single organisation for Central Area bus, tram and trolleybus maintenance. He has been on leave, preparatory to retirement, since the reorganisation of the Central Area engineering divisions into three at the beginning of this year.

Mr. T. J. Stammers

* * *

Mr. Bernard F. Caunt, of Atkinson Vehicles, Limited, is leaving on March 19 on a visit to the company's distributors in South Africa and Australia. Thereafter he will travel to New Zealand and return to England via the United States.

* * *

Mr. C. Garstang, M.T.A.I., chief assistant general manager of Thos. Cook and Son Limited, has been elected chairman of the Association of British Travel Agents for 1960-61. Mr. R. R. May, M.T.A.I., managing director of Poly Travel, Limited, has been elected vice-chairman.

* * *

Mr. F. D. Fitz-Gerald, O.B.E., who has been national secretary of the Traders Road Transport Association since its formation in August, 1945, is retiring at the end of March on reaching pensionable age. He will be succeeded by Mr. H. R. Featherstone, who has been assistant secretary since May, 1958.

Mr. D. Hart has been appointed service engineer with A.E.C. Vehicles (S.A.), Limited, at Johannesburg.

* * *

Following the retirement of Mr. E. Fryer after 12 years' service, Mr. L. Forden, a Manchester bus driver, has been elected chairman of the executive of the Transport and General Workers Union.

* * *

Mr. P. H. Wyke Smith, chief engineer of the Trent Motor Traction Co., Limited, is to take up a similar position with the North Western Road Car Co., Limited, in May.

* * *

We record with regret the death, at the age of 76, of Mr. George Wood, vice-president of Thomas W. Ward, Limited, since 1954. Prior to that year he had been chairman of the company for four years. In all he had served the company for 63 years.

* * *

Mr. D. K. Roberts, diesel engineer of A.E.C., Limited, has just returned from Canada, where he was visiting the Montreal factories of the Canadian Car Co., Limited. This company makes the Can-Car range of passenger vehicles which are exclusively powered by A.E.C. diesel engines.

* * *

Mr. V. G. Swanson has been appointed chairman of the Melbourne Harbour Trust, following the retirement of Mr. A. D. Mackenzie, who held the post for 20 years. Salary for this post is £3,280. Mr. Swanson was formerly chief civil engineer and chief engineer of the ports and harbours branch of the Public Works Department of Victoria.

* * *

The Regent Street Polytechnic in London is holding a two-day symposium on helicopters on April 8 and 9. The fee for the course is three guineas (including registration). Eleven leading authorities will cover all aspects of helicopters, their performance, costs, flying qualities, safety and ground organisation. A flying demonstration may be arranged.

* * *

Composition of the new Northern Ireland Transport Users Committee has been announced. The chairman is Mr. J. C. Drennan and there are 20 other members. The terms of reference of the committee are to consider and make recommendations to the Ulster Transport Authority on any matter affecting the services and facilities of the U.T.A. which is brought forward by the public, the Minister of Commerce or the Authority.

* * *

Mr. D. R. Serpell, at present an Under-Secretary in the Treasury, has been appointed a Deputy Secretary in the Ministry of Transport. It is stated that responsibility for the work of the inland transport part of the Ministry of Transport will, in future, be shared between Mr. Serpell and the present Deputy Secretary, Inland Transport, Mr. J. E. Hampson. Mr. Serpell will deal, in particular, with railway and road transport matters.

* * *

The Nigerian Federal Council of Ministers has considered the chairmanship of the Nigerian Railway Corporation and feels it appropriate, with the approach of independence, for a Nigerian to be appointed to this office. Sir Ralf Emerson's term of office will accordingly terminate on May 31, 1960. The Council wishes to place on record its deep appreciation of the services rendered to the Nigerian Railway since his first appointment in 1953. A public commission of inquiry will be set up later in the year to study the economics, administration and industrial relations of the Nigerian Railway Corporation.

No fewer than 732 past and present Ribble Motor Services employees have now completed 25 years' service. Messrs. R. P. Beddow, chairman of the company (centre, front row), A. F. R. Carling, managing director (right), and H. Bottomley, general manager (left), are here pictured with senior executives and 31 new recipients of 25-years' service awards

Mr. J. G. Norton, assistant regional establishment and staff officer, London Midland Region, B.R., has retired. He joined the former London and North Western Railway as an apprentice clerk in 1915. He was appointed secretary of the Railway Staff Conference in 1947 becoming also secretary of various other railway staff committees. His ultimate position dated from September, 1955.

* * *

Mr. H. Wilkinson, whose appointment as assistant (wages staff) regional establishment and staff officer has just been announced by the London Midland Region, began his railway career as a junior clerk at Bakewell in 1927. Since 1957 he has been assistant staff (motive power) director of traffic services on the L.M.R.

* * *

The 1959 James Clayton prize of the Institution of Mechanical Engineers has been awarded jointly to Mr. C. B. Dicksee, M.I.Mech.E., for pioneering and subsequent development and research work on the high-speed compression-ignition engine, by which he has become recognised throughout the world as an outstanding authority in this field, and to Professor G. F. Mucklow, D.Sc.(Manch.), M.I.Mech.E., for continuous research and experimental work into the propagation of pulses (wave action) in gases, and problems connected with the internal combustion engine. Mr. Dicksee joined the Associated Equipment Co., Limited, in 1928 as engine designer, later becoming research engineer, and in 1929 the production of a compression-ignition engine suitable for road transport was started. Since 1955 he has been a consulting engineer.

At the annual general meeting of the Mansion House Association on Transport held on March 10, 1960, Mr. R. A. McNeile (managing director, Arthur Guinness Son and Co. (Park Royal), Limited) was elected president. Mr. McNeile succeeds Mr. M. F. Barnard, who has served the association as chairman of council and president for a number of years. Mr. A. J. Malacrida is retiring from the secretaryship at the end of the present month. Mr. H. Tudor Williams will act as hon. secretary of the association, now with offices at Murray House, Vandom Street, S.W.1.

* * *

Six high government officials from Finland recently paid a 48-hour visit to the works of A.E.C. Limited, at Southall, and to Simms Motor Units Limited. The party comprised Mr. Klaus Hakkanen, Permanent Secretary-General in the Ministry of Communications and Public Works; Mr. Uno Havu, Chief of Department in the Ministry for Financial Affairs; Mr. Esko Katajarinne, Chief of Department in the Ministry of Defence; Mr. Kalle Tolonen, Director of Government Road Building Department; Mr. Alfred Helio, Director of Government Post Office, and Mr. Vilho Koivisto, Managing Director of Pohjolan Liikenne Oy., Bus and Trucking Company, owned by the State Railways. Accompanying these visitors was Mr. Eero Kytola of Vanajan Autotehdas Oy., a very successful Finnish business man whose last order for A.E.C. engines was to the value of over £250,000. It was anticipated by the two firms concerned that "a considerable volume of increased business with Finland will result from these visits."

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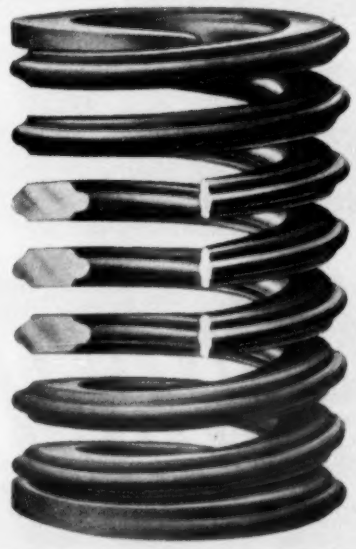

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IMPORTANT CONTRACTS

M.E.A. Comet Order Confirmed

FINANCE for the purchase of four de Havilland Comet IVC air liners by Middle East Airlines is now assured under a British Overseas Airways Corporation guarantee approved this week by the Minister of Aviation. B.O.A.C. has a 49 per cent interest in the Lebanese company, M.E.A. Delay in obtaining Treasury consent for the B.O.A.C. guarantee of instalment payments has held up completion of the contract, which is worth nearly £6 million and might well lead to the sale of further Comets, for several weeks. M.E.A. has an option on a fifth Comet.

T.A.A. Orders Third Electra

Trans Australia Airlines has ordered a third Electra air liner from the Lockheed Aircraft Corporation; it is scheduled for delivery in August and will seat 78 passengers. Two Electras already in service with T.A.A. are averaging more than 11 hr. flying a day each and in just over six months have carried 140,000 passengers.

British Simulator for Irish Air Lines

Aer Lingus and Aerlinte Eireann (Irish Air Lines), which are to take delivery of the first of three Boeing 707-048 air liners in November, has placed an order with General Precision Systems, Limited, Aylesbury, for a flight simulator to be used for pilot training and instrument rating renewals. The simulator, which is scheduled for installation in Dublin by the end of the year and will cost about £100,000, is expected to save a great deal in training costs and contribute substantially to overall training efficiency, according to Mr. J. C. Kelly Rogers, deputy general manager of Aer Lingus.

A.E.C. Home-market Orders

Among recent orders from British operators booked by A.E.C., Limited, are those from Oswald Tillotson, Limited (A.E.C. Bradford and Burnley distributor) for 12 Mammoth Major eight-wheelers and 36 Mercury chassis, closely following an order for 68 goods vehicles placed last month; from Stevinson Hardy and Co., Limited, for six Mk.V Mammoth Major chassis, to be fitted with Darham Industries tank bodies; from British Road Services for a further six Mk.V Mammoth Major eight-wheelers; from London Brick Co., Limited, for 33 eight-wheel Mammoth Major and 10 Mercury chassis; and from F. J. Hope (Transport) for six Mercury articulated tractors.

Portugal Orders B.I.C.C. Cables

British Insulated Callender's Cables, Limited, has received an order from the Lisbon Electric Tramways to provide a link between the Portuguese CNE substation at Moscavide and the Lisbon Electric Tramways substation at Arco do Cego. This valuable order calls for the supply, supervision of installation and jointing of 9,750 yd. of 33kV 3-core aluminium-sheathed Impregnated Pressure cable. It provides a further link in the Santos—Xabregas—Moscavide route, for which B.I.C.C. supplied and installed cables in 1955. In addition, B.I.C.C. has received the order for the supply of approximately 9 km. of 10- and 15-pair twin telephone cable and accessories, to be installed with the 33-kV cable. Cabos Armados e Telefonicos, Lda., the B.I.C.C. associated company in Portugal, will manufacture this telephone cable.

B.P. Lubricants for "Canberra"

British Petroleum Co., Limited, has been awarded an exclusive contract to supply Energol marine lubricants for the new P. and O. passenger liner, s.s. *Canberra*, which Dame Pattie Menzies, wife of the Prime Minister of Australia, launched at Belfast on March 16.

Pilot Launch For Gambia

A Perkins-powered pilot and general service launch for Gambia was recently completed by Brooke Marine, Limited, Lowestoft. The copper-sheathed 37-ft. launch, *Bijilo*, is powered by twin Perkins S6(M) six-cylinder diesel engines, each developing 100 s.h.p. at 2,000 r.p.m. Fitted with an oil-operated heavy-duty gearbox with 2 to 1 reduction, the launch exceeded 13 knots in her trials. It was ordered by the Director of Marine, Gambia, through the Crown Agents for Overseas Governments and Administration.

Leyland (U.S.A.) Starts Operations

The first vehicle to be shipped to the United States by the Leyland Motors Group since it announced plans for marketing its range of diesel goods vehicles there, has just been handed over to Yale Express Systems Inc., of New York City. One of the largest mid-eastern common carriers, Yale had added the new vehicle, an Albion Chieftain fitted with a 20-ft. long van body to its 1,000 strong fleet. A Yale spokesman said his company purchased the Chieftain because there are no competitive diesel-engined domestic vehicles.

SHIPPING AND SHIPBUILDING

Need for International Accord

WHILE they readily appreciated the difficulties which the revenue authorities have in accepting shipping as a special case, said Mr. A. Rigby Hughes, at the annual meeting of the Liverpool Steam Ship Owners' Association, the basic question the Government had to answer is "Does this country need an efficient merchant fleet of modern, competitive vessels?" If the answer is "yes" then, he submitted, the fiscal system must be made the servant of policy, and not its master. International problems were at the root of the malaise in shipping today; he called attention to that point because the situation had undergone substantial change in the postwar years. Shipping always was an international business, but in earlier days they were able very largely to settle their affairs on the commercial level. This was the wish of all British shipowners, but the extension in many countries of governmental control over their national shipping and trade had in recent years raised the twin problems of subsidies and flag discrimination to such a pitch of significance that discussion at governmental level became imperative.

The industry as a whole must indeed be grateful to the Minister of Transport for his deep interest in them among his many other preoccupations, even though they could wish that he and his advisers were not so encumbered. These problems could only be worked out on a basis of mutual trust and understanding, and there had unfortunately been much misunderstanding of the basis of our feelings which he hoped the recent visits of the Minister of Transport would have done much to mitigate. The possibilities of retaliation as a weapon in this argument had been canvassed, and it might be the ultimate sanction—but its logical results would be commercially disastrous. "One can only hope that it need never be used, but that ultimately reasoned argument and persuasion will succeed," said Mr. Hughes.

Bulk Carrier

FROM its Belfast yards, Harland and Wolff, Limited, recently launched a new 18,000-ton deadweight bulk carrier building for Skibsaktieselskapet Dalfonn (Sigval Bergesen), of Stavanger, Norway. The naming ceremony which preceded the launch was performed by Mrs. Baillie, wife of Mr. J. S. Baillie, deputy chairman of Harland and Wolff, who was also present. In addition to the *Tresfonn*, as she was named, Harland and Wolff has a similar bulk carrier on order for this Norwegian group, and a turbine oil tanker of about 42,000 tons deadweight.

I.C.H.C.A. Genoa Conference

AT the invitation of the Italian national committee, the International Cargo Handling Co-ordination Association will hold a technical conference in Genoa in September this year. The subjects for discussion are: the use of mechanical handling equipment on board ship and on the quay, and systems and equipment for the loading, maritime transport and unloading of motor cars. Full details of the meeting will be issued at a later date, but as is customary, the conference is open to non-members of the I.C.H.C.A. as well as members, and a cordial invitation is extended to all those interested in attending.

B.T.C. TRAFFIC RECEIPTS: PERIOD NO. 2—1960

	Four weeks to			Aggregate for eight weeks to		
	Feb. 28 1960	Feb. 22 1959	+ or —	Feb. 28 1960	Feb. 22 1959	+ or —
	(£ thousands)			(£ thousands)		
PASSENGERS						
British Railways	8,775	8,228	+ 547	17,865	16,647	+ 1,218
London Transport						
Road Passenger Services	4,206	3,816	+ 390	8,397	7,793	+ 604
Railways	1,881	1,809	+ 72	3,876	3,672	+ 204
Provincial and Scottish Buses	4,057	3,933	+ 124	8,137	7,924	+ 213
Ships	178	202	— 24	422	461	— 39
Total Passengers	19,097	17,988	+ 1,109	38,697	36,497	+ 2,200
FREIGHT, PARCELS AND MAILS						
British Railways						
*Merchandise and livestock	7,841	7,937	— 96	15,704	15,166	+ 538
*Minerals	3,831	3,581	+ 250	7,781	7,088	+ 693
*Coal and coke	9,849	10,565	— 716	19,568	20,258	— 690
*Parcels, etc., by coaching train	4,032	3,976	+ 56	7,953	7,775	+ 178
*Total Freight British Railways	25,553	26,059	— 506	51,006	50,287	+ 719
Others	4,504	4,024	+ 480	8,223	7,822	+ 401
Total Freight, Parcels and Mails	30,057	30,083	— 26	59,229	58,109	+ 1,120
Aggregate	49,154	48,071	+ 1,083	97,926	94,606	+ 3,320

*Includes receipts from collection and delivery, etc. Comparisons are affected by changes in fares and charges.

FINANCIAL RESULTS

NOTES on the trading results, dividends and financial provisions of companies associated with the transport industry are contained in this feature, together with details of share issues, acquisitions and company formations or reorganisations.

J. Brockhouse

The offer on behalf of J. Brockhouse and Co., Limited, to acquire the 574,710 ordinary shares of 5s. each of Albion Drop Forgings Co., Limited, not already owned by Brockhouse has been accepted by the holders of more than 88 per cent of the shares and is now unconditional.

Rhodesia Railways

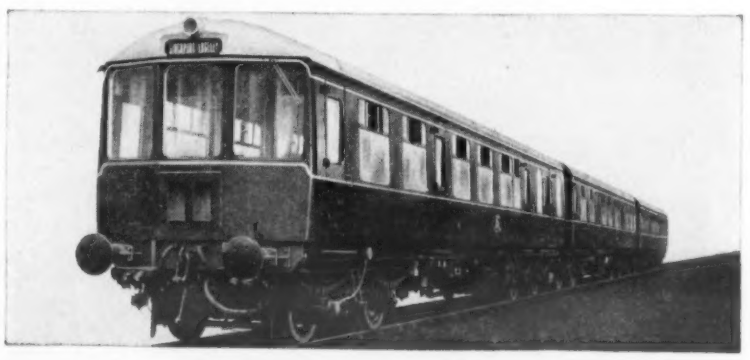
Gross revenue of Rhodesia Railways, Limited, for the year ended June 30, 1959, was £27,368,262, a decline of £2,654,526. Working expenditure, including depreciation and renewals, was £25,260,752. After charging interest and expenses £3,383,751, sinking funds £882,590, depreciation road services £6,626, off obsolete stores £14,409, loss on working Messina-Beit Bridge line £2,560, deficit is £1,808,386 appropriated from rates and wages stabilisation account.

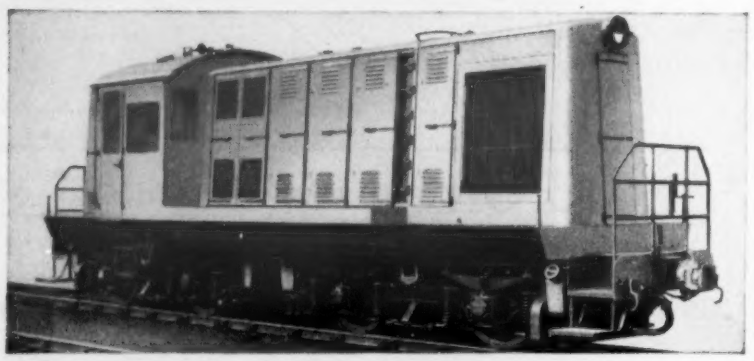
Charles Roberts: Birmingham R.C. and W.

Charles Roberts and Co., Limited, has now made an offer to the Birmingham Railway Carriage and Wagon Co., Limited, as a basis for a merger, involving an exchange of ordinary stocks into a new holding company. Negotiations on a possible merger of the two companies were reported in February. The new holding company's ordinary capital would be in 5s. units. The proposed exchange basis would be three units for each £1 in Birmingham £990,975 ordinary capital, and one for each 5s. unit in Roberts £1,398,150 ordinary. The Birmingham company also has £100,000 in 6 per cent £1 preference in issue, and Roberts £250,000 in 6½ per cent (tax free up to 4s.) £1 preference. Birmingham Railway Carriage directors have decided on an up-to-date valuation of assets before making any recommendation, and this is now taking place.

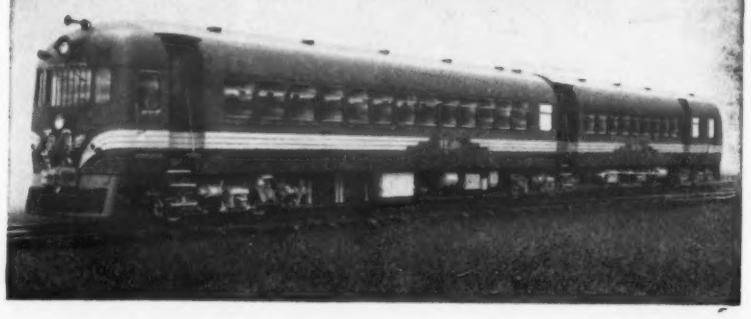
COMMONWEALTH RAILWAYS OF AUSTRALIA
955 H.P. Diesel-Electric Locomotive (10 Ton Axle Load)
In collaboration with Sulzer Bros. (London) Ltd and Crompton Parkinson Ltd.

BRITISH RAILWAYS
Three Unit Diesel Mechanical Railcars





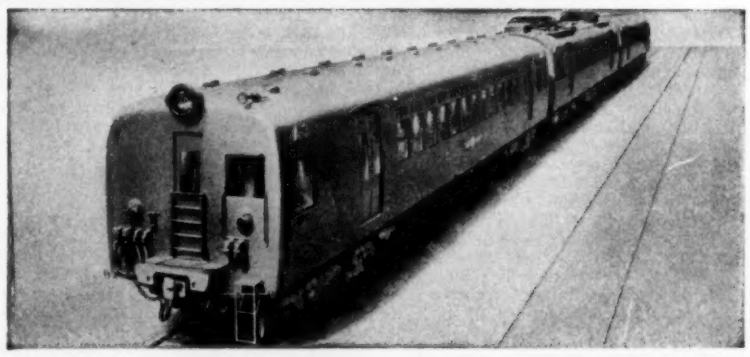
GHANA RAILWAYS
400 h.p. Diesel Electric Locomotive



NEW ZEALAND GOVERNMENT RAILWAYS
Twin Articulated Diesel Mechanical Railcars
In collaboration with The Drewry Car Co. Ltd.

BRITISH RAILWAYS
1,160 H.P. Diesel-Electric Locomotive
In collaboration with Sulzer Bros. (London) Ltd and Crompton Parkinson Ltd

SANTOS JUNDIAI RAILWAY, BRAZIL
3,000 Volts, 800 H.P. Three Car Train
In collaboration with The English Electric Co. Ltd.



THE BIRMINGHAM RAILWAY CARRIAGE & WAGON CO. LTD
Smethwick
TELEPHONE SMETHWICK 1881
TELEGRAMS 'CARRIAGE SMETHWICK'

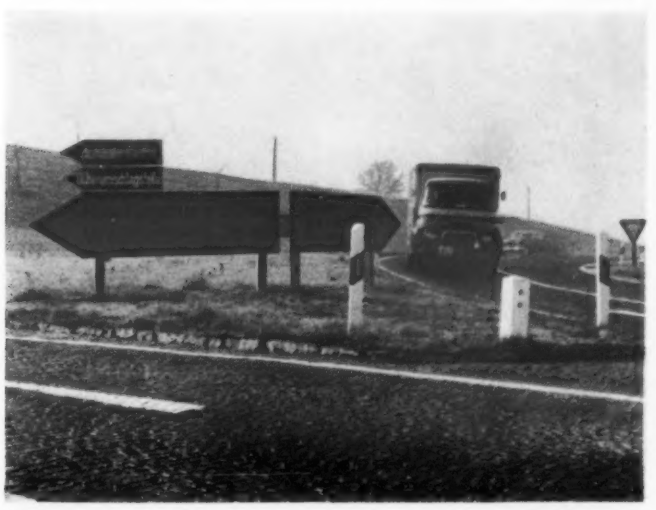
Printed by Odhams (Watford) Limited, St. Albans Road, Watford, Herts, for and published by Modern Transport Publishing Co., Limited, Russell Court, 3-16 Woburn Place, London, W.C.1.

SWITZERLAND GETS THE BIRDS

How a 7 ton Austin takes 9 ton of frozen chickens from Rotterdam to Zurich

The Austin 7-tonner crosses from Holland into Germany. Dutch customs officials stand ready to check papers. Throughout the long transit through Germany, the Austin's doors are sealed and are unsealed again only at the Swiss frontier.

Crossing the bridge over the Rhine at Arnhem—all too familiar name—early in the journey. This Austin 7-tonner has only recently been brought into service by Bischofberger A.G. of Zurich.



Rejoining the main Rhineland Autobahn after a night's rest at Montabaur. Fritz Zurbrugg has the highest praise for the Austin's cornering which compares very favourably with other vehicles, in his opinion.

Coffee break over—and it's back to the Autobahn at night. Like the new British motorways, this highway enables high average speeds to be maintained.

The journey completed, the Austin 7-tonner is easily manoeuvred into place for unloading. Beside her the two other Austins of Bischofberger A.G.—Austin 7-tonner and a 5-tonner.

AN AUSTIN 7-TONNER with trailer crosses Europe from Rotterdam to Zurich with a cargo of frozen chickens . . . just one of the many Austins in use on continental routes today. Her owners are Bischofberger A.G. of Zurich, a firm that specializes in the international food trade . . . a trade that calls for rapid and reliable transport because the goods are perishable. Bischofberger have 3 lorries in operation at the moment—all of them Austins. One of these vehicles recently covered 150,000 miles in a single year.

Continental operation on long-distance high-speed routes is a severe test of a vehicle. Here's what driver Fritz Zurbrugg—on the road for 24 years—had to say about his Austin. "I can handle this 7-tonner like a far smaller vehicle. It corners beautifully and it's a pleasure to drive. And its engine is wonderful".

The all-purpose Austin commercial range includes vans and trucks from $\frac{1}{4}$-7 tons, plus tippers and prime movers for 15 ton weights. All with 12 months' warranty and backing of B.M.C. Service.

AUSTIN

THE AUSTIN MOTOR COMPANY LIMITED

LONGBRIDGE · BIRMINGHAM

BMC

the 'M1' for the Continent

Twice every day, sometimes three or four times a day, heavy lorries and trailers use this motorway for the Continent. They drive on to the cross-Channel ferries at Dover and a few hours later drive off at Dunkerque, en route from Birmingham to Brussels, Manchester to Milan or Sheffield to Strasbourg—in fact, from anywhere here to anywhere over there.

And the traffic is increasing.

Exporters know it is good business to use these ferries.

Deliveries are quicker—often next day—and packing can be cut to a minimum.

It will pay you to find out more about this service.

SOUTHERN
BRITISH RAILWAYS

Drive on·drive off DOVER-DUNKERQUE
CROSS-CHANNEL SEA FERRIES

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